iamu International Association of Maritime Universities

日本財団 The Nippon Foundation

10th Annual General Assembly and Conference

MET Trends in the XXI Century: Shipping Industry and Training Institutions in the global environment – area of mutual interests and cooperation

Saint Petersburg, Russian Federation
September 19 – 21, 2009

MET Trends in the XXI Century: Shipping Industry and Training Institutions in the global environment – area of mutual interests and cooperation

Editor in Chief
Vladimir Loginovsky

Proceedings of the 10th Annual General Assembly
And Conference of the International Association of Maritime Universities

Admiral Makarov State Maritime Academy

Saint-Petersburg, Russia
19 – 21 September, 2009

MET Trends in the XXI Century: Shipping Industry and Training Institutions in the global environment – area of mutual interests and cooperation / Тенденции подготовки морских кадров в XXI веке: судоходная индустрия и учебные заведения в глобальном пространстве взаимных интересов и сотрудничества / под ред. проф. д-ра техн. наук В.А. Логиновского – СПб.: Изд-во ГМА им. адм. С.О. Макарова, 2009. – 404 с. – Текст на англ. языке.

ISBN 978-5-9509-0046-4

This volume includes the papers presented at the 10th Annual General Assembly of International Association of Maritime Universities (IAMU), which was held on the basis of the Admiral Makarov State Maritime Academy in St. Petersburg 19 – 21 September 2009.

В сборник вошли доклады, представленные на 10-й Ежегодной Генеральной ассамблее Международной ассоциации морских университетов (JAMU), которая проходила на базе Государственной морской академии имени адмирала С.О. Макарова в Санкт-Петербурге 19 –21 сентября 2009 г.

The texts of the papers in this volume were set individually by the authors or under their supervision. Only minor corrections to the texts may have been carried out by the publisher.

Тексты статей написаны авторами в индивидуальном порядке или под их контролем. Издателем были проведены лишь незначительные корректировки в текстах.

ISBN 978-5-9509-0046-4

Dear Colleagues,

IAMU, with its mission of intensification of international cooperation in the fields of maritime knowledge, education, training and research, represents the core of uniquely innovative and proactive global network in contributing to keep and shape the World Maritime Culture today and tomorrow.

On behalf of Admiral Makarov State Maritime Academy and the Nippon Foundation, it is a great honor and privilege for me to invite your participation at the 10th Jubilee Annual General Assembly (AGA 10) of the International Association of Maritime Universities (IAMU) which is held in Saint Petersburg, Russian Federation in September 19 – 21, 2009.

IAMU has reached impressive results for 10 years of its activity: the number of members has been increased from 7 to 50 Universities, which are united in the effective network system, IAMU has received NGO status at IMO since the year of 2007; the membership in IAMU is of a great interest for a number of MET Institutions, which present at AGA 10 with the status of observer.

Remembering Dr. Sasakawa's stating that, «it is vital for many sectors of society to work together» the theme of AGA 10 is **«MET Trends in the XXI Century: Shipping Industry and Training Institutions in the global environment - area of mutual interests and cooperation»**.

Assembly takes place at an important time for IAMU and the global maritime community. This year "Go-To-Sea Campaign" launched by IMO Secretary-General in 2008 gathers strength. Comprehensive review of STCW Convention and Code is a very important event linking functionally the activity of MET institutions and Industry. This year Russian Federation celebrates 200-year anniversary of Transport Education. During these days we have the opportunity not only to summarize the results of IAMU activity but to make plans and set goals and objectives for the future.

We are also looking forward to the IAMU Student program, which is held in the AMSMA campus. Besides cultural and sport activities, participating students will have the opportunity to present their research on a wide variety of maritime topics associated with the main theme **«Opportunities and challenges for Youth to work in the Shipping Industry»**, and to visit AMSMA classes and Makarov Training Centre.

The first Round Table of IAMU with Shipping Industry and some Maritime Administrations on hot topics of seafarers' quality and supply/demand ratio is organized within the Assembly. The general theme of the Round Table is **«Seafarers: Quality, Quantity and Career Development»**.

We believe that the 10th Annual Assembly of International Association of Maritime Universities in Saint Petersburg becomes an important step forward to Maritime Education and Training, reflecting the positive cooperation with the Shipping Industry for mutual benefit.

Dr. Valery L. Mikheev,
Chair of AGA 10 Local Executive Committee,
Rector of Admiral Makarov State Maritime Academy

CONTENTS

Part 1. PAPER PRESENTATIONS

Part 2. PUBLICATIONS

Part I. PAPER PRESENTATIONS

IAMU FROM INFANCY TO MATURATION THROUGH THE LAST DECADE

Osman Kamil Sag,
Prof. Dr.
Founding Chair and Honorary Fellow of IAMU
Founding Rector of Piri Reis Maritime University of Turkey
E-mail: osmankamilsag@pirireis.edu.tr

More than a decade has passed since Prof. Dr.Kiyoshi HARA, President of Kobe University of Merchantile Marine, and humbly myself started our around-the-world journey to visit Maritime Universities of Excellence of the World in August 1999 to discuss and encourage our colleague universities to participate in the then extremely innovative and ambitious campaign of initiating IAMU, with the very generous sponsorship of the Nippon Foundation.

Two Founding Universities (ITUMF, KUMM) and five Representative Universities (AAST-MT, AMC, MMA, CARDIFF, WMU) one from each Continent to effectively cover the World and NF, all devoted to excellence and innovation in MET gathered in Istanbul in November 1999 for the Preparatory Meeting to design the original BASIC AGREEMENT of IAMU.

Globalisation, standardization, quality assessment in MET leading to Maritime Safety and Environmental Protection, promotion of safety management systems, utilising scientific and academic approach had been some of the Keywords of the Association working out the Basic Agreement.

It was my great honour and privilege to be elected as the Founding Chair of the Association, and the memorably fruitful Preparatory Meeting put ITUMF in the position to host the Inaugural General Assembly of IAMU at Istanbul in June 2000 with the attendance of 24 Universities from 16 Countries, and the Nippon Foundation.

The Goals of the Association in the Original Basic Agreement were then summarised as the scientific and academic approach to:

- The new comprehensive and objective MET system for the next generation;
- Maritime Safety Management System and the new framework of the International Maritime Society;
- The near uniformity in 'Undergraduate Curricula' and 'International Certification Systems' for Competancy.

I also vividly recall, as the Founding Chair of IAMU; humbly recommending some of my own, personal ideas as then possible future IAMU Project Proposals, which were

- IAMU as an NGO at IMO;
- IAMU as a Registration Authority;
- IAMU as a Training Provider and IAMU Model Courses;
- IAMU Research and Development Facility Activities;

– IAMU as a Seafarers Examination Center;
– IAMU as a Seafarers Language Examination Center;
– IAMU Graduate School;
– IAMU Center of Excellence;
– IAMU Compendium of Maritime Institutions;
– IAMU Maritime Educational Training Awards;
– IAMU Regular Publications in Citation Index.

I am so proud and delighted to witness during the last decade, while reaching to a membership of 51 Universities from the Globe, IAMU achieved much more than the originally targeted goals of the Association, the most important of all, having been granted an NGO Consultative Status at IMO, a clear indication of the recognition of IAMU's contributions towards enhancement of the quality and standards of MET throughout the world.

I would like to utilise this opportunity to fullheartedly convey my utmost indebtedness to Dr. Sasakawa, and Madam Sono; Chairpersons of Nippon Foundation and Honorary Chairs of IAMU; Mr. Terashima and Mr. Nagamitsu; Executive Directors of NF for believing in us and supporting the good cause of IAMU throughout the last decade.

I believe it will also be most loyal to commemorate at this stage all Founding Officers of IAMU, quite a number of whom are not within the Association today. Thus, I like to extend my sincere gratitute to Prof. Dr. Hara of KUMM, President Tyler of MMA, Dr. Laubstein and Prof. Dr. Zade of WMU, Dr. Moukhtar of AAST-MT, Dr. Otway of AMC, Prof. Dr. Inoue of KUMM and Mr. Yamamoto of ITUMF and all other distinguished members of IAMU who had been the driving force and masterminds of the whole Association during the Inauguration Period.

I am also utmost grateful to H/E Madam Atsuko Toyama, then Ambassador of Japan to Turkey, later Minister of Japan for Education, Culture, and Sports who also gave vast support, guidance and encouragement to the establishment of the Association during the embryotic stages.

It has been a great honour, privilege, and heartfelt nostalgy for me to be invited to give one of the Key Note Speaches at IAMU AGA 10, and thus conveying my congratulatory Message in Person on the occasion of the 10^{th} Anniversary of IAMU.

The next decade will permit the IAMU Membership and the International Executive Board to develop the Association roadmap for the XXI Century. That certainly is our challenge, and firmly carrying the belief that it will be more than successful, it will leave a legacy from each of us for those who will join us in the near and long term in a common quest for the betterment of the Maritime Society.

May the Future Decades of the Association prove even more successful than the Decade that has gone by, and bring you ALL and IAMU well deserved success on the route to idealise the MET of the Globe.

THE RESEARCH AS A LOCOMOTIVE OF CAPACITY BUILDING AT IAMU MEMBER INSTITUTIONS

Vladimir Loginovsky,
DSc, Prof.
Admiral Makarov State Maritime Academy
E-mail: vl.loginovsky@rambler.ru

Abstract. This paper has been composed by materials of January 2008 – June 2009 IMO meetings, that may have an impact on IAMU members activities ,development and capacity building. The Leximancer software was used to make the general analysis of these materials.

1. INTRODUCTION

Today "knowledge sharing", being based on Research, is becoming a key issue in collaboration of Higher Education with Shipping Industry, which needs knowledge from Universities but Universities also need practical knowledge from Industry. University's maritime education is not only fundamental for raising safety, security and protection of environment. It also has a significant impact by creating cadres of informed and thinking young people in support the general economic development of Industry. Intellectual links of Universities with Industry also are very important for Capacity Building in Educational Research activities of MET Institutions itself. Such kind of collaboration needs the creation of global area of mutual interests and mutual capacity building. It may be considered as a very significant trend in the XXI Century both for Universities and the globalizing Shipping Industry. But it is not enough to establish capacity, it must also work. One of the ways for IAMU to start the work in this area of mutual interests is its NGO activities in International Maritime Organization, which should be based on regular researches.

The paper addresses some, by author's vision, important concepts that should be built and researched within the IAMU's NGO work at IMO and can positively impact the capacity building of IAMU in general and its members in particular. Formal conceptual approach is proposed to tune the professional network of researches that can be used for long term activities in maritime research, education, training and assessment in collaboration with Shipping Industry.

2. FORMAL CONCEPTUAL ANALYSIS OF IMO BODIES ACTIVITY DURING CAPTIONED PERIOD

2.1. Concepts and their importance

What is concept? Concepts in Leximancer are collections of words that generally travel together throughout the text (Leximancer Manual Version 2.2, 2005). This paragraph addresses the principle formal research of captioned IMO texsts[1]. The most frequently current concept appears in the set of texts, the most important it is. So, the most important concept in the captioned set of texts[1] is *ships* and the least important is *near miss*, see Table1 and Annex.

[1]The following related documents were processed to make formal and informal analysis of topics by January 2008-June 2009 IMO materials that may be useful for IAMU research activity: FSI16/18, FP53/WP.5, FP53/WP.5, BLG12/17, TC58/13, MEPC58/23, LEG94/12, FAL35/WP.6, COMSAR13/14, MSC85/26/Add.2, MSC85/26/Add.1, MSC85/26, MSC 84/24/Add.2, MSC84/24/Corr.1, MSC 84/24, MSC 84/24/Add.1, MSC 84/24/Add.2, MSC 84/24/Add.3, STW40/INF.3, STW40/WP.1, STW40/WP.2, STW40/WP.2/Add.1, STW40/WP.2/Add.3, STW40/WP.2/Add.2, STW40/WP.3, STW40/WP.3/Add.3, STW40/WP.3/Add.1, STW40/WP.3/Add.2, STW40/WP.4, STW40/WP.5, STW40/WP.6, STW40/WP.6/Add.1, DSC 13/20, MEPC58/23/Add.1, SLF51/17, NAV54/25, SLF51/WP.5, DE 51/28, MSC 86/26.

Table 1

Concepts and their formal importance (for abbreviations, see Appendix)

Concept	Relative Count	Concept	Relative Count	Concept	Relative Count	Concept	Relative Count
ships	100 %	Msc	22.6 %	Lrit	7 %	Fp	4.8 %
cargo	**87.2 %**	**knowledge**	**20.8 %**	**SA**	**6.5 %**	**Fsi**	**4.6 %**
safety	48.9 %	engineer	20.5 %	education	6.3 %	Stw	4.5 %
equipment	41.1 %	fire	18.4 %	Nox	6.2 %	**Fsa**	4.5 %
training	38.1 %	navigational	17.7 %	Ais	6.2 %	leadership	4.5 %
regulation	37.1 %	casualty	16.3 %	Slf	6 %	De	4.4 %
assessment	36.2 %	manning	15.1 %	fatigue	5.7 %	Dsc	3.7%
resolution	33.4 %	master	14.7 %	Blg	5.4 %	Human_Element	2.1 %
competent	27.1 %	position	14.5 %	research	5.3 %	Fal	2.1 %
hazards	26.1 %	security	12.2 %	Nav	5.3 %	Leg	1.5 %
environment	25.5 %	Mepc	10.9 %	Comsar	5.1 %	Lng	1.3 %
oow	24.2 %	**e-navigation**	10.6 %	skill	5 %	Tc	1.1 %
oil	23.4 %	situation	9.8 %	Imdg_Code	5 %	**Near miss**	0.1 %

2.2. MSC 84/85 activities being shared with other IMO bodies

Taking into account, that MSC is one of the main IMO committees and referring also to outputs from Table1, we have analyzed if the captioned concepts shared by other IMO bodies, using the conditional probability approach. Using the list of concepts, it was identified, that MSC 84/85 shared its activities with the following Committees and Sub-committees (Fig. 1). MEPC activity was the most close to MSC area of work and there was no shared activity with the Legal Committee at all.

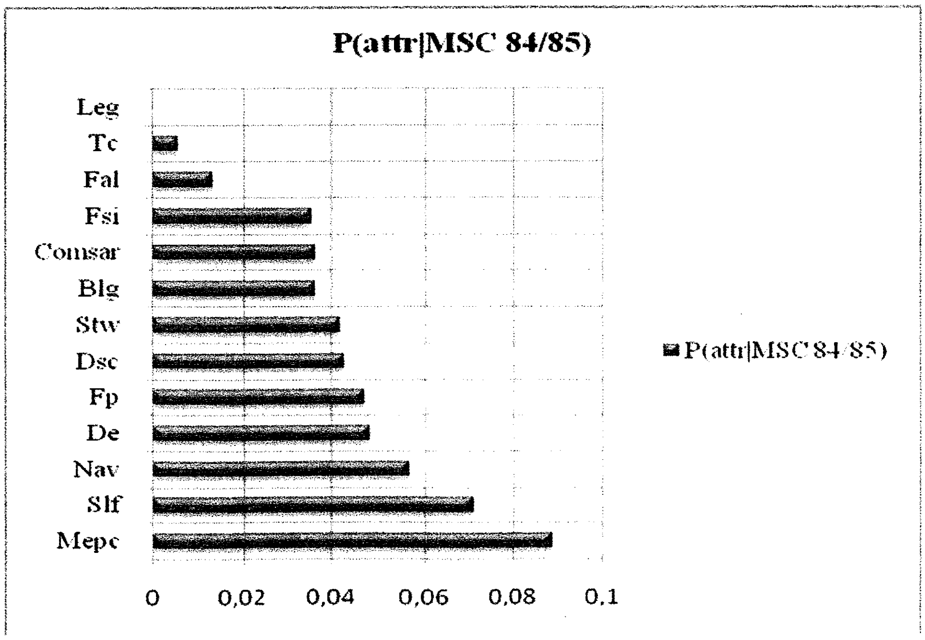


Fig. 1. MSC 84/85 activities being shared with other IMO bodies during January 2008 – June 2009

To process papers we used LEXIMANCER software for formal identification of 52 the most important (frequent) concepts and to understand their contextual similarity, which can help to identify the probable gaps from the view point of MET and research positions.

2.3. Contextual similarity

The more closer together the concepts appear on conceptual map, the more contextual similarity they have, (Fig. 2).

Location of concepts on Fig. 2 reveals, that in spite of STW Sub-Committee is involved in comprehensive review of STCW 78 Convention and Code, *Human Element* concept has a very poor contextual similarity with such concepts as *assessment, knowledge, education, OOW, training, manning, FSA, near miss, fatigue, e-navigation, situation awareness* etc. But could we state that *education, training* or *situation awareness* are not the components of *Human Element* or *e-navigation* or *FSA's* risk control options/ measures? It is an evident that all these very significant for safety concepts are correlated with coefficient close to 1 and should be considered and developed together. Education and training should be the base and origin of all this analyses related safety. It is MET institution's research business and optimum way to build their own capacity and cooperation with industry.

Using the above list of concepts, let's select the most important issues, in the research of which the IAMU members can be involved.

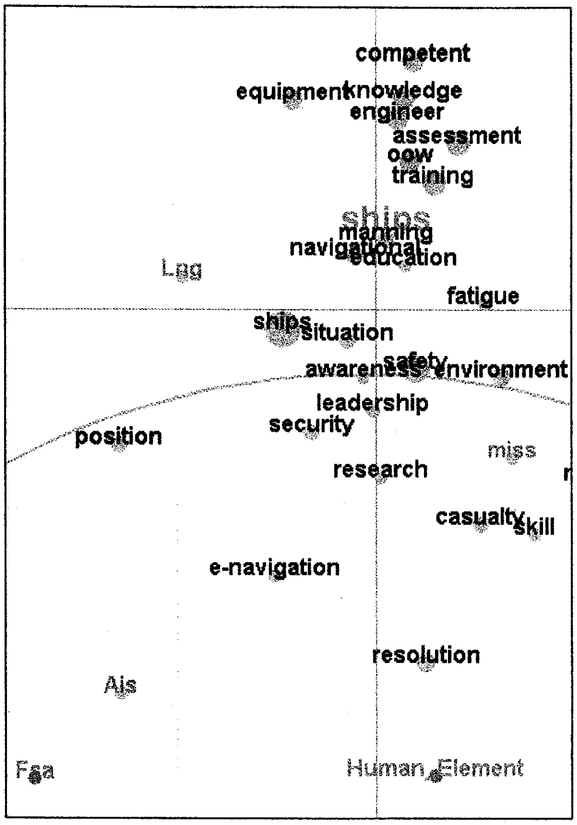


Fig. 2. Contextual similarity

3. LOGICAL NETWORK OF CONCEPTS FOR PRELIMINARY RESEARCH IN WHICH IAMU CAN BE INTERESTED AND INVOLVED

3.1. Situation Awareness (SA, relative count is 6.5 %)

Whatever we considered on negative contribution of Human Element into safety at sea (80 – 90 % of accidents), the "results from maritime operations literature survey revealed that 71 % of human errors were Situation Awareness related problems", (Grech, 2002).

A general definition of SA (by Endsley), that has been found the more close to marine navigation describes SA as "the safety driven perception of the elements in the environment within a volume of time and space (navigational area), the comprehension of their meanings (dangers, marks, ships, lighthouses…) and the projection of their status in the near future (developing of navigational situation). In other words SA involves the real-time processing of event-based information coming from an evolving situation in an attempt to understand what is happening" (Matheus et al., 2003).

The following quote is important: "Today's (navigational) systems are capable of producing a huge amount of data. The problem with today's (navigational) systems is not a lack of information, but finding what is needed when it is needed. Unfortunately, **in the face of this torrent of data, many operators**

(OOW) may be even less informed than ever before. This is because there is a huge gap between the tons of data being produced and disseminated and people's ability to find the bits that are needed and process them together with the other bits to arrive at the actual information that is required for their decisions..." (Endsley, 2000).

Traditionally the following so called "seed words" can be used for clarification of SA levels (Moore, 2007):

- Level 1SA = (perception, detection, recognition, identification);
- Level 2 SA = (comprehension, combine, interpret, store, retain, information);
- Level 3 SA = (project, projection ,dynamics, anticipate, future, events).

We need to take into account, that Situation Awareness is in STW intention to be included into 2010 pack of STCW amendments and it is worth to be done.

The literature review has identified several dimensions of SA that are specifically related to surveillance. However, no one dimension adequately addresses the knowledge of Seafarer (deck officer), who has to perform surveillance activities. At the same time, it does not seem likely that a combination of these dimensions would capture the construct that is of interest here. Therefore, focus on components of SA has not yet been particularly fruitful in shipping industry and MET institutions activity (Loginovsky et al., 2006). There is no doubt, that such concepts as teaching, learning, training and assessment should be adjusted for Situation Awareness.

The next paragraph is very much consistent with the Situation Awareness principles.

3.2. E-navigation (relative count is 10.6 %)

Definition: E-navigation is the harmonized collection, integration, exchange, presentation and analysis of marine information on board and ashore by electronic means to enhance berth to berth navigation and related services for safety and security at sea and protection of the marine environment, (IALA's e-NAV Committee).

In principle, it is new ideology of IT-based navigation and communication, which smoothly but confidently supplants the traditional and classic navigational techniques, creating new IT oriented vision on education and training of seafarers. In spite of electronic navigational equipment applies on board of vessels long ago, one can say that nowadays is transitional period from classic navigation to e-navigation (from paper charts to electronic ones). It is obvious, that the transition state is hardly good for safety but good for research, as uncertainty gives a lot of tasks to be solved in favor of raising the safety.

E-navigation is intended to meet present and future user needs through harmonization of marine navigation systems and supporting shore services. Research indicates that around 60 % of collisions and groundings are caused by direct human error. If e-navigation without proper education and training of seafarers could assist in improving this aspect, both by well-designed onboard systems and closer cooperation with vessel traffic management (VTM) instruments and systems.

However, although e-navigation may be able to improve the situations described above, there is also a need to recognize at a new stage the classic role of the practice of good seamanship, the provision of suitable training and the use of procedures.

IAMU can find itself before the vast and challenging field of research, triggered by IMO. To build, research and then understand the new ideology, to find its proper implementation and identify possible gaps in training at first we need to build and research the statistical concept of e-navigation, the results of which should be professionally interpreted into a logical concept and only then go ahead.

Why do we need at first to build the statistical (conditional probability) concept automatically extracted from publications? The main reasons can be as follows:

- There is a huge amount of publications in this and adjacent fields of knowledge, hence it is impossible to read all of them and process them manually;
- There is also the urgent need to identify the strong connectivity and very weak links between the components of a concept, including Human Element, Situation Awareness...etc.

The following "seed concepts" can be used to build the general and core concept of *e-navigation: additional value of e-navigation, information, integration, safety ,formal safety assessment, security, risk*[2]*,situation awareness*[2] *human element, decision making*[2]*, education, training, navigational near misses ,fatigue, mental workload...ECDIS, IBS/INS...,GMDSS, AIS...LRIT...GNSS.*

When the statistic and professional e-navigation concepts are built and understood, one can go ahead in carrying out further research projects in the field and develop teaching, learning, training and assessment technique based on situation awareness ideas.

3.3. Investigation into near misses (relative count is 0.1 %)

Near-miss: A sequence of events and/or conditions that could have resulted in a loss, or in an outcome with more severe consequences than actually occurred. This loss was prevented only by a fortuitous break in the chain of events and/or conditions. The potential loss could result from human injury, environmental damage, or negative business impact (e.g., repair or replacement costs, scheduling delays, contract violations, loss of reputation), (MSC 84/15/4).

The aprioristic data on accidents (history) at sea which is traditionally used by FSA to identify risk of accidents have some serious shortcomings due to not representative samples of such non sufficient and time – extended data. It is resulted in low efficiency of the analysis of root-causes of accidents, poor prediction of situations and therefore it affects on improving of safety as all the accidents has already occurred.

But in accordance with Heinrich's Law (6) dangerous situations (near misses, incidents...) precedes accidents and catastrophes) and that is why just they should be used primarily for risk analysis before accident occurs.

But in accordance with Heinrich's Law (6) dangerous situations (near misses, incidents...) precedes accidents and catastrophes) and that is why just they should be used primarily for risk analysis before accident occurs.

Quoting paper (6) and adapting to shipping industry, it can be said, that "today, relatively few problem areas are identified through accident investigation", however Safety Management System based on ISM Code provisions is the main instrument of doing it. "One reason for this is that most causes do not reach the "accident" stage, because someone, usually the" master and crew, "saves the ship". Waterborn "emergencies that are safely recovered belong in this category; they are events that could have been accidents. In reality, they should be considered as accidents, accidents that did not result in injury or damage. And it is here that a fallacy becomes apparent: these "accidents" will not be analyzed for accident potential because there was no injury or damage. They are ignored in much the same way as the polluted water."

"The seriousness of this shortcoming was identified by H. W. Heinrich, a noted pioneer in the scientific approach to accident prevention, when he observed that ". . . for every mishap resulting in an injury [or damage] there are many other similar accidents that cause no injuries [or damage] whatever." He reached the conclusion that, in a group of similar mishaps, 300 will produce no injury whatever, 29 will result in minor injury, and one will result in major injury. He emphasizes that the importance of an individual mishap lies in its potential for creating injury and not in the fact that it actually does or does not. Therefore, any analysis as to cause and remedial action is limited and misleading if based on one major

---

[2] The terms *"situational awareness", "risk assessment" and "decision making"* will be included in new version of STCW Convention

accident out of a total of 330 similar accidents, all of which are capable of causing injuries or damage. In other words, those who limit their study to isolated, spectacular cases, major aircraft accidents, are looking only at the tip of an ominous iceberg..."

"Accidents do not occur frequently enough to establish trends, particularly at lower echelons of command. Unless a trend is established, commanders may be forced to treat the effect rather than the cause of accidents."

So, it is call of times to include ISM Code ideology principally based on Heinrich's Law (near misses collection, analysis and implementation for risk assessment) into FSA techniques as a long term research. Education and training aspects should be also included into such a research and linked with the navigational near miss analysis based on AIS /VTS information (it is also the adjacent field to e-navigation).

3.4. Formal Safety Assessment (relative count is 4.5 %)

What is FSA?

FSA is a rational and systematic process for assessing the risks relating to maritime safety and the protection of the marine environment and for evaluating the costs and benefits of IMO's options for reducing these risks. The use of FSA is consistent with, and should provide support to, the IMO decision-making process. It provides a basis for making decisions in accordance with resolutions A.500(XII) "Objectives of the Organization in the 1980's", A.777(18) "Work Methods and Organization of Work in Committees and their Subsidiary Bodies" and A.900(21). Objectives of the Organization in the 2000s (MSC/Circ.1023 MEPC/Circ.392, 5 April 2002).

Reverting to conceptual map (Fig. 2), one can repeat, that such very important for safety at sea concepts as *FSA, Human Element* and *education, training, competence*...are very poor contextually, and that means also professionally, linked.

Rising trends of marine accidents both in terms of numbers and costs are mainly associated with collisions and groundings. There are numerous examples of collisions and groundings that might have been avoided had there been suitable input to the navigation decision-making process. So, the decision – making process based on research, selection and implementation of appropriate Risk Control Options/Measures should be analyzed from the viewpoint of competence and experience of seafarers.

It's also obvious that such components of Human Element as academic background, level of competency, skill ...etc. can be included into FSA procedure for risk assessment and identification of appropriate RCO/RCM, which can help to answer the question "What level of education the Industry needs from seafarer?

"In many parts of the world recognition of competence is a necessary professional requirement for employment, career development and, unfortunately, liability insurance. As interest in the Human Element grows, not least in response to the awareness raised by Alert!, there will be a need for recognition of competence in the skills related to the science and practice related to addressing Human Element issues in the marine context... What is required in terms of professional recognition is a scheme that recognizes a range of academic backgrounds and gives due regard to experience and achievement", (Alert, Issue No. 12 July 2006).

FSA is a very important and useful tool for making decisions which is continuously improving by IMO. Situation Awareness is also goal-driven techniques used for Decision Making, but it is much closer to Human Element nature. The combination of two techniques can give useful results for improving safety, security and protection of environment.

Some more words about FSA: it is very academic and ambitious area of research and can be extended to a lot of fields related to safety at sea. Being consistent with the above paragraphs the following new seed concepts can be taken taking into consideration as "seed Risk Control Options/Measures" for further steps of research : *quality of seafarers, education and training, fatigue, seagoing experience ..., manning, potential risk (based on near misses), hazards as a function of MET level, decision making..., e-navigation...*

CONCLUSION

Based on considerations above the following may be concluded:

(a) In spite of Information Technologies are widely applied in MET and Shipping Industry, one can be considered, that both Industry and MET are in transitional period of applying them, which can be characterized by the raising risk of accidents. To improve the situation the vast spectrum of breakthrough researches should be carried out, including coherent and in-depth investigation into such cross correlated concepts as: *Situation Awareness, E- Navigation, Near Misses and Formal Safety Assessment*;

(b) At first, formal conditional probability network should be built and researched, which helps to identify all the tight and weak links between the components of the above concepts, which further can be professionally interpreted;

(c) The following key concepts (not words) for building the core Research Domain are cross correlated and should be treated jointly: *situation awareness (perception, comprehension, projection, shared situation awareness), human element, **education, training, assessment, skill,** manuals* and *guidelines, information, mental workload, fatigue, manning, safety, security, protection of environment, formal safety assessment, decision making, performance of actions, ...e-navigation, information technology, communication...accident investigation...*etc, as the independent research of them is supposed here to be not efficient.

References:

[1] Endsley, M. R. and Garland D. J (Eds.) (2000) Situation Awareness Analysis and Measurement. Mahwah, NJ: Lawrence Erlbaum Associates.

[2] Grech M.R., et al. Human error in maritime operations: analyses of accident reports using the Leximancer tool, Key Centre of Human Factors and Applied Cognitive Psychology, University of Queensland, Brisbane, Qld, 2002.

[3] Moore D., Principles of Situation Awareness, Applied to Corporate Decision Support Systems, BusinessAvionivs Monday, April 23, 2007.

[4] Loginovsky et al. Research on Situation Awareness Measures relevant to Navigating Bridge Team Surveillance Functions, Final Report, IAMU, 2007.

[5] Matheus C., Kokar M. Baclawski and K., Phase I Final Report: A Formal Framework for Situation Awareness. AFRL Funding Number: F30602-02-C-0039, January 2003.

[6] http://www.airpower.maxwell.af.mil/airchronicles/aureview/1973/jul-aug/nichols.html.

Annex I

List of Abbreviations

AIS	Automatic Identification System
BLG	Bulk Liquids and Gases
COMSAR	Sub-committee on Radiocommunication Search and Rescue (IMO)
COMSAR	Radio-communications and Search and Rescue
DE	Ship Design and Equipment
DSC	Carriage of Dangerous Goods, Solid Cargoes and Containers
ECDIS	Electronic Chart Display and Information system
FC	Facilitation Committee
FP	Fire Protection
FSI	Flag State Implementation
IACS	International Association of Classification Societies
IALA	International Association of Lighthouse Authorities
IBS	Integrated Bridge System
IHO	International Hydrographic Organization
IMO	International Maritime Organization
ISO	International Standardization Organization
LC	Legal Committee
MEPC	Maritime Environment Protection Committee
MSC	Maritime Safety Committee
NAV	Safety of Navigation
SLF	Stability and Load Lines and Fishing Vessels Safety
SOLAS	International Convention for Safety of life at sea
STW	Standards of Training and Watchkeeping
TCC	Technical Cooperation Committee
VTS	Vessel Traffic Services

MET SYSTEM IN RUSSIAN FEDERATION

Ivan Kostylev,
DSc, Prof.
President, Admiral Makarov State Maritime Academy
E-mail: i.kostylev@gma.ru

200 years ago in Russia management of water and land communications as well as the Corp of Engineers of Communication Lines were established. Certainly, maritime training existed earlier especially in the coastal areas but in the year of 1809 for the first time the Transport Education System was founded.

Thus, Russia has very rich history of water transport both sea and river. For many years in our country there have been separate ministries of transport mode, including the Ministry of sea and river fleets.

Years of Perestroika and transition to new terms of economic development were accompanied by reforms, and nowadays sea and river transport has become a part of Federal Agency of Sea and Water Transport. Only 3 years ago in Russia there were 3 higher and 7 secondary maritime educational establishments as well as 4 higher and 21 secondary river educational establishments. In recent years in the process of reorganization of the entire education system in Russia the Ministry of Transport and our Agency have made a great work on transport education preservation under the Ministry of Transport. Besides, secondary schools were included in the structure of academies and universities in their profile. Today we have 7 educational complexes where higher and secondary levels of education are remained.

MARITIME:

- Makarov Maritime State Academy;
- Ushakov Maritime State Academy;
- Nevel'skoy Maritime State Academy.

RIVER: Saint-Petersburg, Nizhny Novgorod, Novosibirsk, Moscow.

The next stage is inclusion of primary professional education into these integrated Complexes.

The Russian system of training of water transport specialists differs from the major part of maritime countries by the fact that for a long time maritime fleet, river fleet, fishing fleet and, of course, navy fleet were separate departments. About 30 years ago the Ministry of Education established training-methodical departments which develop unified methods of educational standards on professional training. For water transport it was designed and is preserved at Admiral Makarov State Maritime Academy. This fact can be partly explained by active cooperation of our Academy with related educational institutions of other countries. We actively worked in IVLA, participated in the educational programs of WMU, city of Malmo, Sweden, we were accredited in the Institute of the Marine-Engineers (London). Our Academy, one of the first institutions in Russia, became a member of International Association of Maritime Universities and, to our opinion, we rather successfully participate in its activity.

Returning to the history of the Russian Maritime Education it is necessary to underline the fact that our academy is the oldest maritime educational establishment, it is 133 years old. In 1944 three Higher Maritime Institutions were established – in Leningrad, Vladivostok and Odessa. The basis of marine science and pedagogics in Russia to a great extent was formed by the teachers and graduates of our Academy. Rectors in Vladivostok and Novorossiysk were subsequently makarovtsy.

The unique feature of the Russian Higher Maritime Education is the integration of the scientific and pedagogic activities. Through the scientific schools of the Academy a lot of lecturers and scientists of Bulgaria, Poland, China and Germany have passed.

The particular page of our participation in formation of the maritime education is Cuba. More than 10 employees of the Academy for 2 – 3 years lived in Cuba, created both material resources, and training programs.

The Russian system of seafarers training has also very specific part-provision of enterprises and vessels with specialists for the Northern Sea Route. Only in our Academy there is special Arctic faculty and only in our Academy training of seafarers for vessels with nuclear power installations is provided.

Nowadays a new page of development of the North is opening and we prepare specialists for developing of shelf territory. Specialists for gas-carriers are of great interest not only in Russia.

Almost all maritime institutions round the world have training complexes. In our Academy in 1994 we created the special training centre and today it is capable to implement more than 80 programs, including the most advanced for tankers and gas-carriers.

Speaking about the quantitative part of seafarers training in Russia there are 15000 persons trained only on High Professional Education programs and 12000 persons by Secondary Professional Education.

From the point of view of quality of training there is no any single opinion at optimum duration of training in the world. Certainly, all requirements of STCW are fulfilled, but the volume of fundamental knowledge is different. In Russia we consider that the level of bachelor is not appropriate for the maritime specialties.

In 2003 Russia joined Bologna process, and in 2007 Vladimir Putin, the President of Russian Federation, signed the law of two-level education introduction in Russia, i.e. the bachelor and the master. However, separate directions preserved the level of specialist training with period of training of 5 – 5,5 years including conventional specialties of seafarers.Our position is based on the fact that the Academy graduate may move from the watch officer position to the Master position without additional training and in case of transition to work ashore his education should be sufficient for engineering posts. Certainly, there must be Advanced Training System.

So what is the specific feature of training in Russia now. First of all, it is rather new process of active introduction of private (non state) educational institutions.For example only in Saint-Petersburg out of 100 higher educational institutions 50 % is non state. In maritime training system in most cases private institutions carry out programs of additional training, various short-term courses and simulation training. The higher maritime education is provided only in state institutions.

Currently in Russia there are a lot of private shipping companies, which are not supplied with required personnel, and they use services of crewing agencies as well as foreign shipowners.

The system of open international market of seafarers facilitates experience extension of international crews forming. According to approximate estimate, about 60000 Russian seafarers work in foreign companies.

Obviously this fact directs us to the more detailed study of seafarers training system in different countries and to our programs improving. We are sure that the 10th Jubilee IAMU Assembly like all previous ones will be rather useful and our dialogue on the level of leaders will be aimed at improving of seafarers training quality and will ensure safe shipping both navigational and environmental which is very important for all countries.

THE GLOBAL FINANCIAL CRISIS: ITS IMPACTS ON WOMEN AND MARITIME BUSINESS

Layla Elsaeed,
Prof. Dr.
President assistant for female Education
Elsayed Abdelgalil,
Prof. Dr.
President Counsellor for International Maritime Affairs
Arab Academy for Science & Technology & Maritime Transport
E-mail: lelsaeed@aast.edu, l_elsaeed@yahoo.com

Abstract. This paper deals with the impact of financial crisis on women and its impact on maritime businesses. First, The International Labour Organisation ILO warns economic crisis could generate up to 22 million more unemployed women in 2009, jeopardize equality gains at work and at home. Furthermore, of the UN chief UN commission states that: a legal framework that ensures the promotion and protection of women's rights is now crucial. On the other hand, we can also take the view that crises may provide opportunities. It is highly recommended to factor gender considerations into the crafting of national stimulus packages and social protection measures and invest in women and girls as smart economics.

Secondly, there are still business opportunities in the maritime industry although the sector is suffering from its worst downturn due to the global financial crisis, says Wilhelmsen Ships Service Malaysia managing director Winston Loo.Moreover, The Dubai Maritime City Authority on Tuesday said that the emirate had witnessed a 31 per cent growth in the registration of new maritime businesses in 2008 compared to 2007, reflecting huge demand for maritime and boat-building services. Also, Southeast Asian leaders were expected to endorse easier monetary policies and make a stand against protectionism on Sunday as they conclude a summit overshadowed by the worst financial crisis in decades. Further still, Port executives are playing an influential role in the imminent launch of what will be known as 'Women in Maritime Asia Region'. In addition to that, women in shipping gather to address criminalization markets and other concerns at international maritime in New Orleans Over 200 women from 17 countries gathered in New Orleans for an international maritime conference being held by the Women's International Shipping and Trading Association (WISTA).

THE LATEST SITUATION OF THE GLOBAL ECONOMY CRISIS

The Global economic activity is declining.

The developed economics are experiencing their strongest declines since the II war, reflecting a crisis and real activity, notwithstanding continued policy efforts.

The world economy is expected to decrease from -0,5 % to -1 % in 2009, before recovering gradually in the course of 2010.

The recovery will depend on more coordinated efforts to stabilize financial conditions as well as sustained strong policy support to strengthen demand.

The latest International Monetary Fund (IMF) World Economic Outlook of March, 2009 projected that the World economy will decline from 3,2 % in 2008 to an average 0,75 % in 2009 before recovering to 2 % in 2010. Emerging and developing economies are expected to decline from 6,1% in 2008 to 2 % in 2009. The economies in developed countries will sharply decline from 0,8 in 2008 til 2008 to -3,25 % in 2009.

The US economy is expected to drop to -2,6 % in 2009 before growing slightly to 0,2 % in 2010, 2 % in 2010.

The Euro area and Japan will both experiences sharp declines to -3,3 % and -5,8 % respectively.

China's growth is projected to slow from 9,4 percent in 2008 to 5,5 percent in 2009, World trade volumes are expected to contract in 2009 for the first time since 1982 from 4,2 % in 2008 t from 4,2 % in 2008 to -2,8 % in 2009 before recovering to 3,2 % in 2010, 2.8 % in 2009 before recovering to 3,2 % in 2010.

This decline is driven first and foremost by a sharp drop in demand, as the global financial crisis imposes a rare simultaneous recession in high-income countries and a sharp slowdown across the developing world. The global credit crunch is likely to affect private investment especially, which is the most cyclical and most internationally traded component of GDP. At the same time, the credit crunch is restricting export finance.

IMPACT OF THE FINANCIAL CRISIS ON WOMEN AND FAMILIES

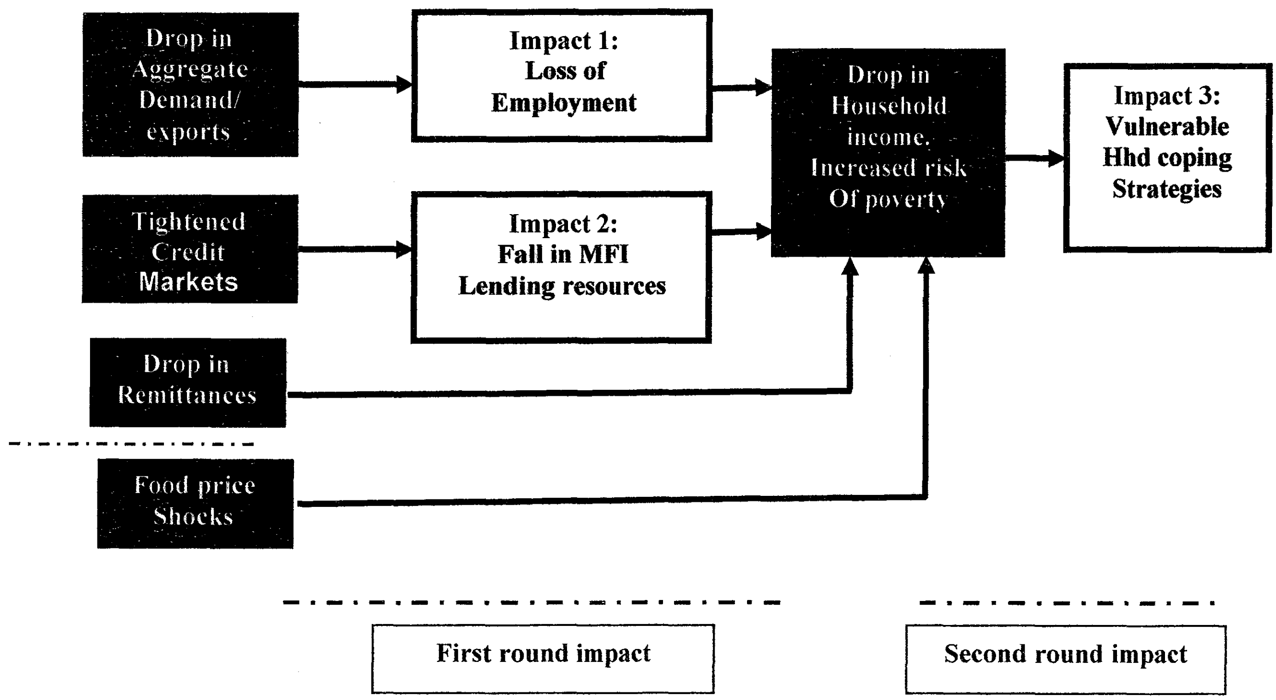
According to PREM Gender and Development World Bank February (2009) there are

Three Main Messages

- The financial crisis will have gender-specific impacts.
- Effects on women and children, if ignored, will both increase current poverty and imperil future development.
- Effective policy responses should build on women's roles as economic agents.

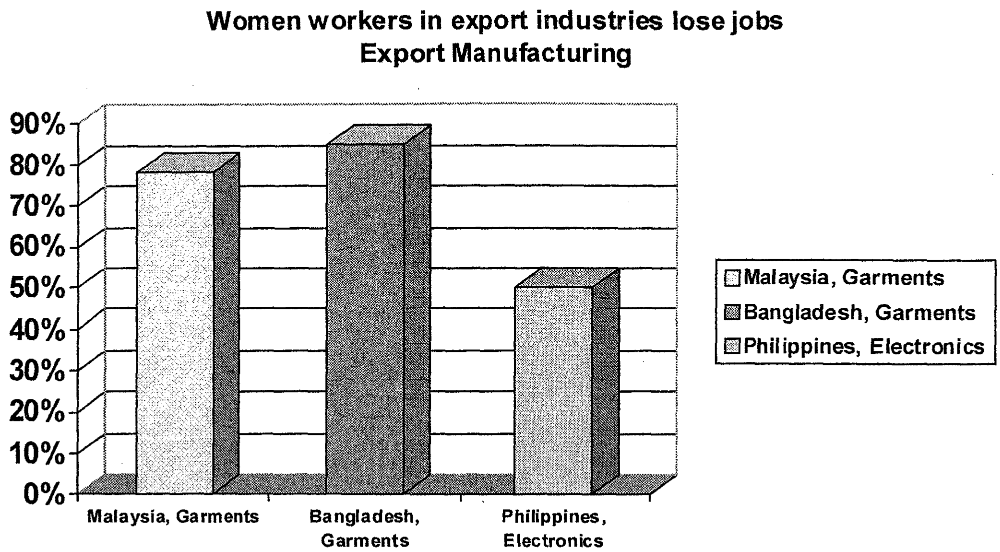
Impacts

The crisis has first and second round impact on women and families

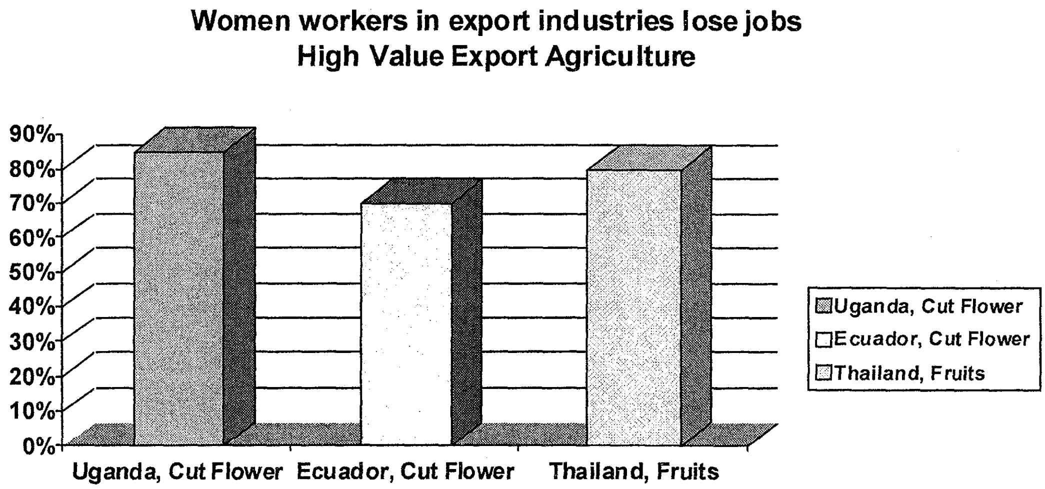


Impact 1: Women workers in export industries lose jobs

Country	Industry	% of world force female
Malaysia	Garments	78 %
Bangladesh	Garments	85 %
Philippines	Electronics	More than 50 %



Country	Industry	% of world force female
Uganda	Cut Flower	85%
Ecuador	Cut Flower	70 %
Thailand	Fruits	80 %

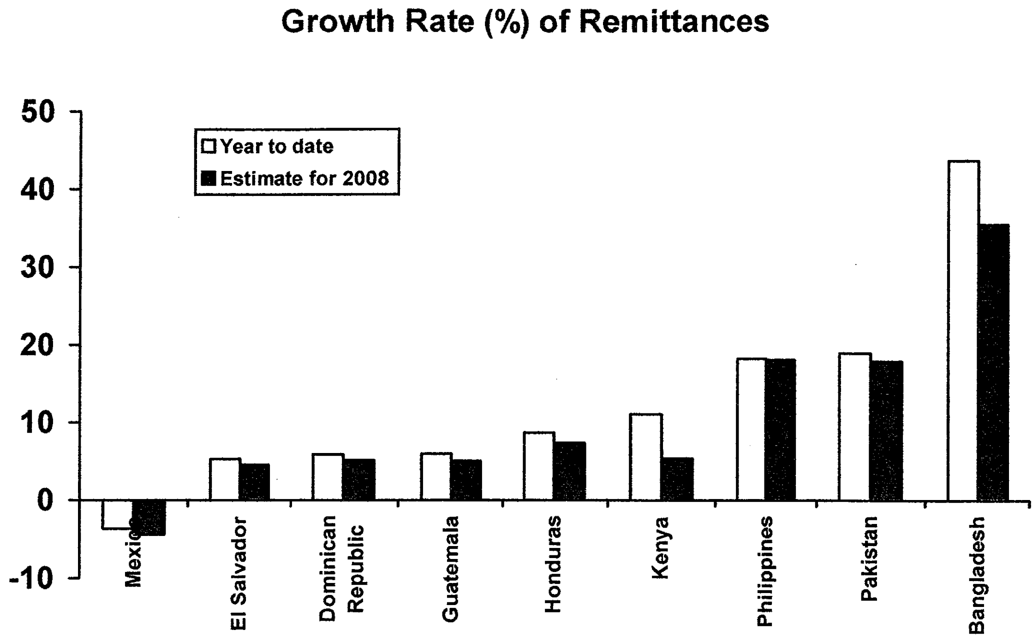


Impact 2: Tightening credit markets can squeeze MFI loans to women producers

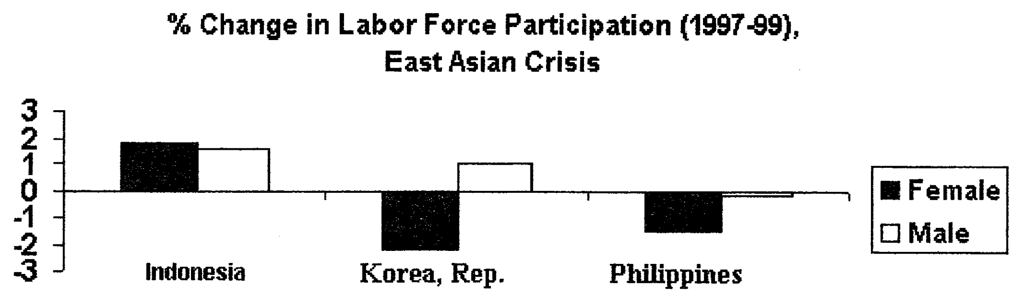
MFIs typically lend to women:

- Over 3,330 MFIs reached 133 million clients in 2006;
- 93 million of the clients were among the poorest when they took their first loan;
- 85 % of these poorest clients were women.

Drop in remittances lowers income available to HHS



HH Coping Strategy
HHs sends women to work



HH Coping Strategy
HHs pulls girls (and boys) out of school

Low income countries:

– Madagascar (fall in Ag income) → girls more likely to drop out of schools;

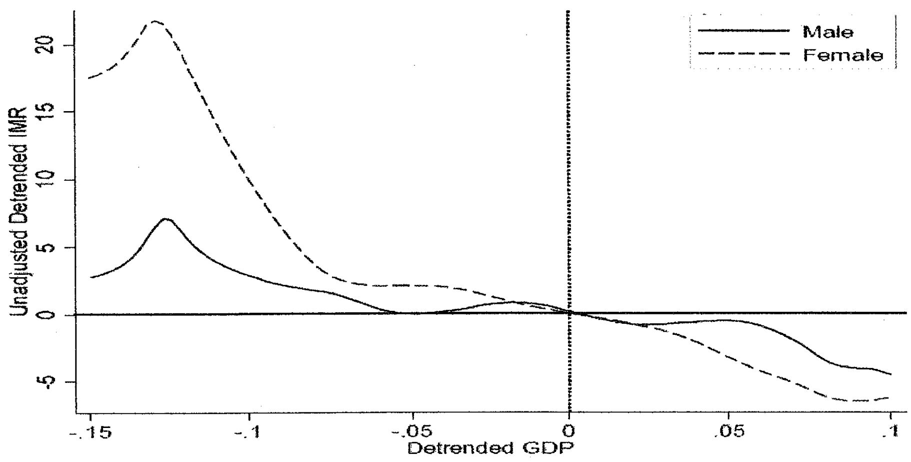
– Cote d'Ivoire (drought) → enrollment decreased 11 ppts for girls and 14 ppts for boys.

Middle income countries:

- Mexico (peso crisis) → girl's attendance fell by 8 %, no impact on boys;
- Peru (1980s crisis) → no impact on school enrollment for girls or boys, schooling increased.

HH Coping Strategy
HHs cut back on health investments, affecting girls disproportionately

Girls' (IMR) exceeds boys' during economic downturns

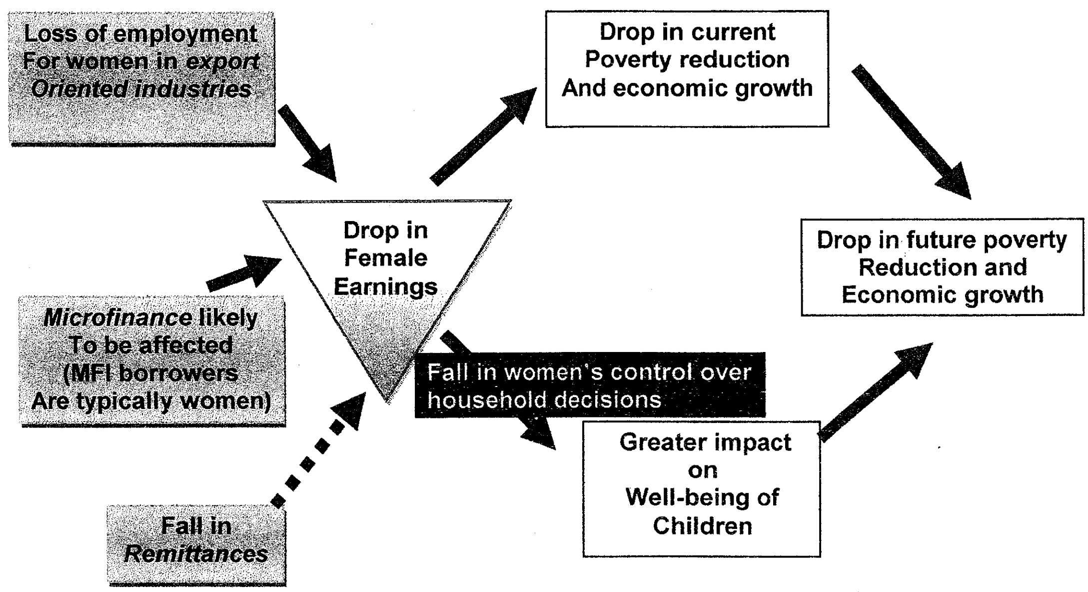


Data from 59 developing countries, different years ranging from 1985 to 2004

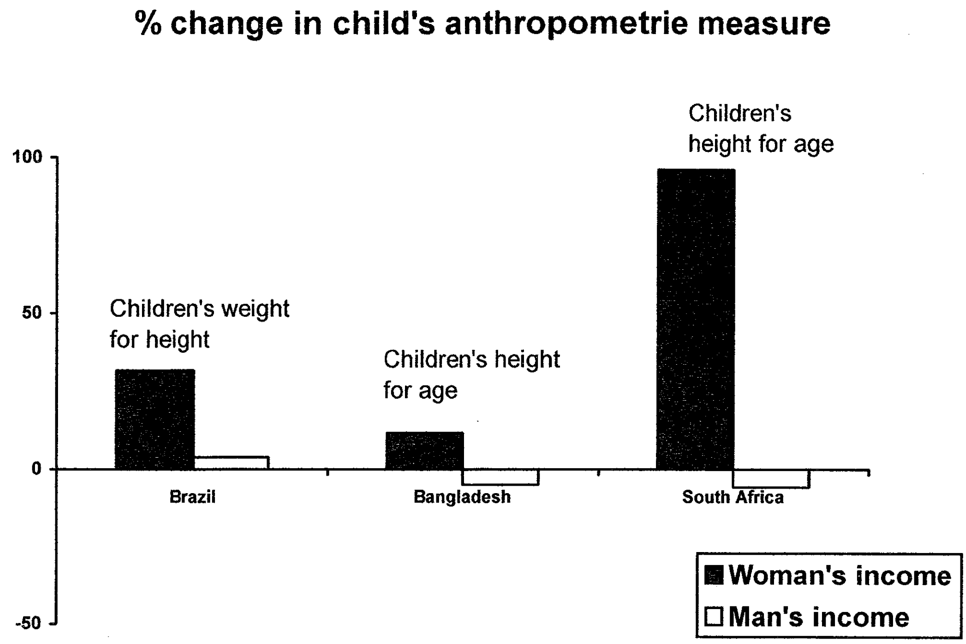
Policy implications

Priority Investment increase women's incomes in poor HH because:

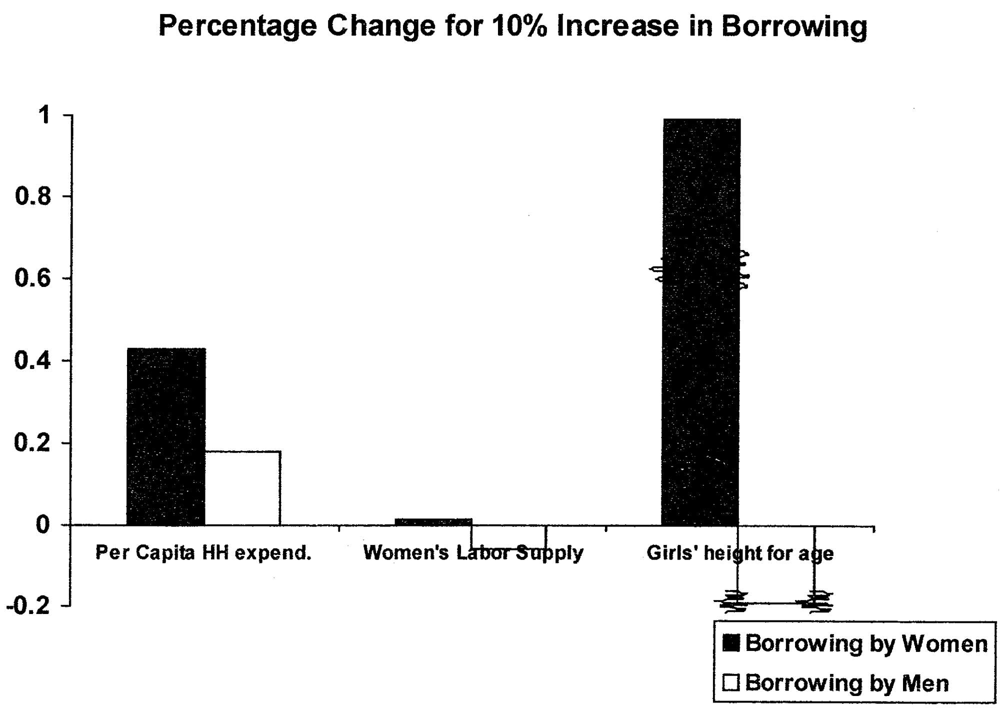
Loss of women's earnings can have long-term welfare impacts.



– Income transfers to women have larger effects on children's nutritional status than similar transfers to men.

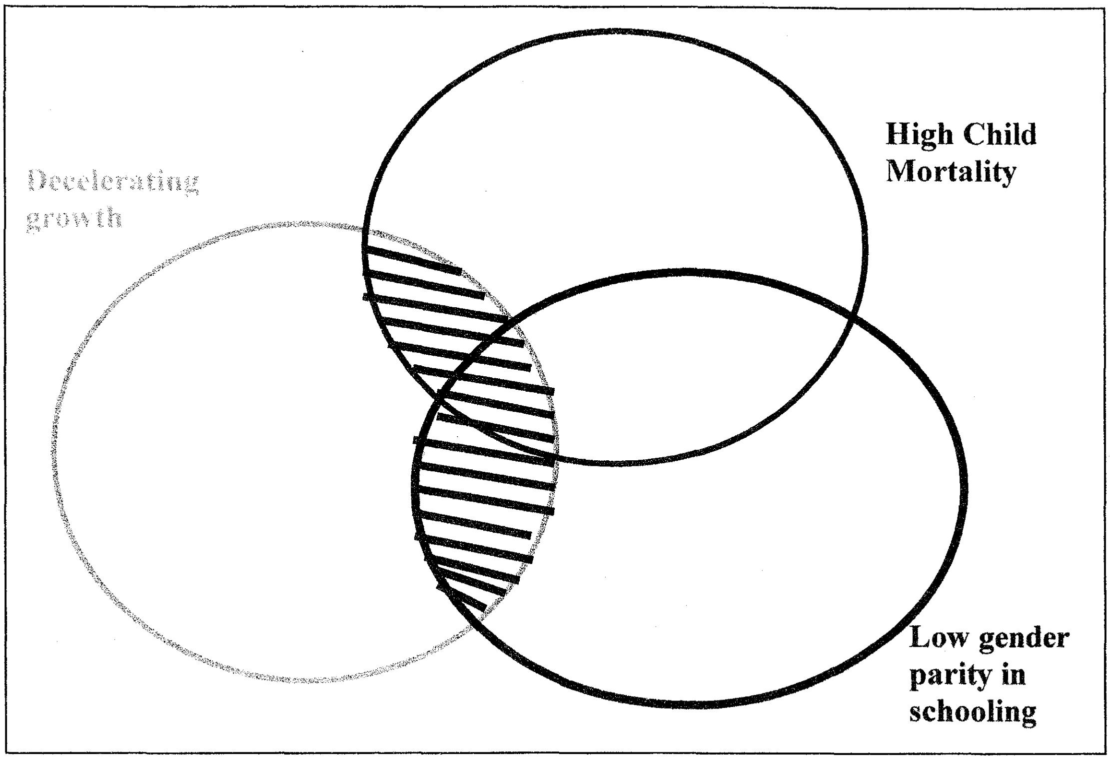


– The effect of female borrowing on hh welfare is larger than the effect of male borrowing (e.g. Bangladesh).



Especially in the set of 33 to 52 countries where women are most vulnerable to the effects of the crisis.

Women & girls in 50 % of countries in the sample (of 90) face moderate to high exposure to negative impact of crisis.



Bank's Response
Mapping impacts to policy

Impacts	Policy/programs
Women's employment	Employment generation programs
Women and girls' human development	Cash transfer programs Other social safety net programs
Women producers	Capitalization of microcredit

World Bank Group's Gender Action Plan will allocate its financial resources in 2009 to assist in ensuring that WBG responses to the crisis maximize women's income, especially in those countries where women and girls are most vulnerable to the effects of the crisis.

Impact of the Economic Crisis on the World Seaborne Trade

Preliminary assessment of the impact of the Global economic crisis on the maritime freight trade indicates that the annual percent change (APC) of the World Seaborne trade is expected to decline to 0,1 % in 2009 from the estimated 2,8 % in 2008 before climbing back to 2,4 % in 2010. Meanwhile, the APC's of the major world waterways are expected to decrease in 2009 to -9,9 %, -9,7 % and -10,5 % for the Panama Canal, Suez Canal and the St. Lawrence Seaway respectively. This forecast does not include the affect of the Somali piracy problem on the Suez Canal Traffic.

A rise in protectionism would worsen the already grim outlook for world seaborne trade. It is always tempting for governments to introduce new trade barriers when jobs and wages are at risk. The effect could further shrink global trade and consequently the world seaborne trade could decline much more than the expected 0,1 % in 2009.

The Impact of the Financial Crisis on Shipping Industries

The shipping crisis - What happened?

A global crisis from financial to real market that led to:

Phase 1. A shortage in money...

Phase 2. Then in transportation demand...

Phase 3. ... And finally a surplus in supply (shipping market).

Why should we still be concerned?

Supply is reducing through:

- Scrapping vessels since October 2008 (but still low);
- Cancelling orders since October 2008.

The main issue is then on the future impacts for the:

- Scrapping markets?
- Ship building markets?

Two open questions for the future

Shipping activities are by nature international and cyclical and markets will adjust and are already adjusting. But what will be the impact on quality shipping?

For markets with old fleet structure we can expect that older ships will be scrapped first (short term positive effect).

At the same time, low freight rates will push ship-owners to reduce costs (long term negative effect).

Q1. The final effect on quality shipping will depend on the duration of the crisis.

Scrapping and shipbuilding activities are by nature cyclical and regional.

There is no doubt that market will adjust but it will be done through huge migrations of population from one region to another.

The question is then:

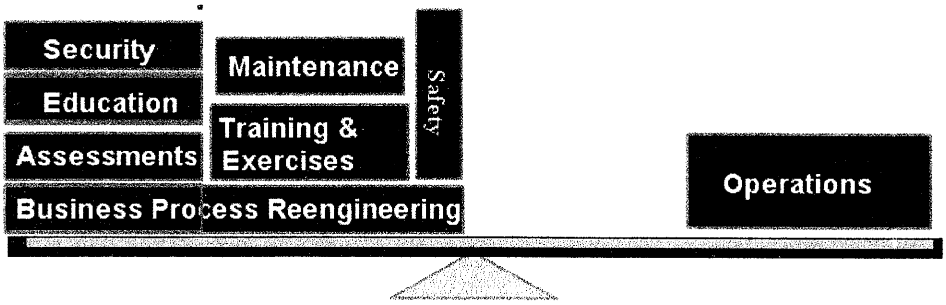
Q2. Should we let the market adjust or should we regulate to change the rules?

THE DILEMMA

In difficult economic times, resources for improvements, security and maintenance become even more scarce:

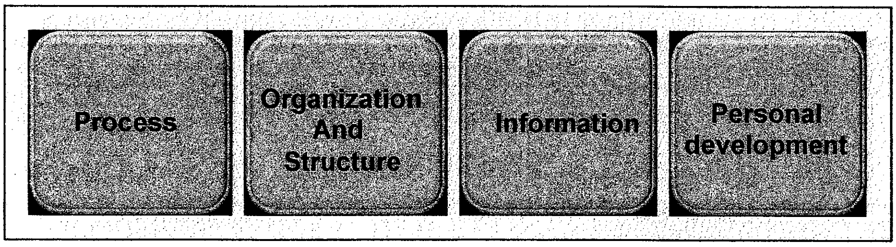
– How do we gain efficiencies?
– Do we do planned lifecycle replacements?
– What can we afford?
– What are the important tradeoffs?
– Do we really need training, education and exercises?

There is an important balance that must be maintained ...

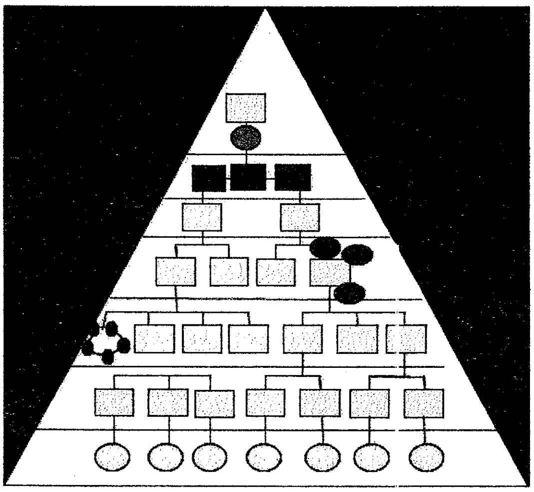


Developing Capacity in Difficult Economic Times

Even during difficult economic times, leaders and managers must look for ways to improve operations, ensure the long-term viability of the ports and ensure trained personnel



Structure & Organizations

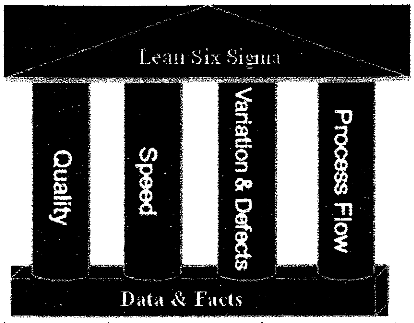


– Focus on the customer;
– Concentrate on the core business;
– Organize around the work;
  - Eliminate "non-value added" work;
  - Operations drive the structure;
– Establish the correct number of organizational layers;
– Establish clear accountabilities & authorities – delegate whenever possible;
– Example: Use of technology can enhance efficiency of dispatchers & Patrols.

What can be eliminated?

Is the organization aligned with the process?

Processes



Program	Lean Thinking	Six Sigma
Theory	Remove waste	Remove variance
Focus	Flow focused	Problem focused

Examine the process of the Operation to determine if there are:

- Unnecessary steps
- Waste
- Variability on the steps

– Question: What adds value?

- Core processes
- Flow

– Employ best practices and

- Performance metrics

– Examples:

- How long does it take to load the Ship? How long should it take?
- Are containers sitting for days? Waiting to be loaded?

Examples

1. Develop and Institutionalize Better Business Processes.
2. Improve Processes & Organizational Structure.
3. Conduct Training & Exercises.
4. Make Use of Simulators.
5. Conduct Tradeoff Analyses.

References

[1] Dr. Mohamed Shaaban Mohamed. Head of Communication & Computing Systems Department Globalization and Maritime Education and Training (MET) Problems and Solutions "World Maritime Excellence" AASTMT-ISC 28 – 29 March 2009.

[2] Hazem Ghonima. CEO, CILT North America & President, TAF Consultants Second International Forum for Education, Training and Maritime Transport Industry March 29 – 30, 2009.

[3] Dr. Daniel Gerstein Vice President, Strategic Security Integration, MPRI Port & Maritime Operations in Difficult Economic Conditions Impact of the Global Economic Crisis on the maritime Freight Flows.

[4] Professor Pierre CARIOU World Maritime University "International Forum for Education, Training & Maritime Transport Industry" The impact of the financial crisis on shipping industries March 29 – 30, 2009 Alexandria, Egypt.

[5] Impact of Financial Crisis on Women and Families PREM Gender and Development, World Bank February 2009.

QUALITY MARITIME EDUCATION AND TRAINING

Suresh Bhardwaj,
Captain, fics, fcmmi, mni
Vice Chancellor,
AMET UNIVERSITY, Chennai, India,
(India's First Maritime University).
E-mail: caps.s.bhardwaj@ametindia.com

GLOBAL OVERVIEW

Shipping industry is a trailblazer in globalizing employment. Irrespective of where the ships are registered, or ownership, or management is based; seafarers come from any part of the world. This allows many advantages in recruitment and employment flexibilities.

Seafarers' culture, attitudes, attributes, education, work ethics vary – but they have to meet common, industry wide competence and attitudinal requirements for safe, efficient and clean operations in the industry.

International Maritime Organization (IMO), a specialized agency of the United Nations is entrusted with the responsibility of making rules and guidelines for prescribing the competence requirements for the industry. All the seafaring nations signatory to IMO ratify the conventions and implement the same through instruments and machinery of own administration.

Hence, Global Minimum Training standards do exist.

WHAT IS WRONG

However, deficiencies do exist.

- STCW has not achieved a truly universal standard. There is too much of non-compliance (some willful), too much room for interpretation and competence is not validly assessed.
- Industry does not have a strong commitment to training, which is seriously under-resourced and with insufficient recognition given to the investment aspect of training.
- There is a shortage of competence in delivery of Maritime Education and Training, globally; and the professionalism, expertise and industry experience of trainers need strengthening.
- There is little commitment to continuing development of competence.
- Attention is too concentrated on technical aspects and fails to evolve with the times.

SOME SUCCESS STORY

Seafaring, as a profession, has seen extinction of historical sources of manpower and emergence of newer areas. The BIMCO-ISF survey report of 2005, which is the authentic industry reference, highlights, (a) shortage of skilled manpower at management levels to escalate, and, (b) a shift of sourcing to Indian subcontinent, Far East and Eastern Europe.

In 2005, 42 % of the burden of seafaring was shared by Asia alone.

It is a matter of great satisfaction, that the world today sees India as a place of achievement and potential, a source of intellectual capital and a driver of global growth in the 21st century. India made significant investments in higher education; and that is - in a sense, the basis of today's knowledge economy.

So is also the case with Maritime Education and Training. If today the Indian seafarer is the most preferred nationality in the world of shipping, it is only thanks to the pioneers and their consistent focus on the same.

At the operational and management levels on ships, India has emerged as the most preferred nation for sourcing of skilled and competent manpower. There are many reasons for this:

a) The basic education system in India is very robust and provides strongest foundation for building high *standards of skills, initiatives, professionalism and leadership required.*

b) The Indian Government has prescribed highest levels of entry criteria in the world, for entry into the seafaring profession and undergoing pre-sea courses.

c) Because of strict age restrictions at entry level, the Indian seafarers have the best age profile.

d) The young population in India is the largest in the world, and seafaring still being a preferred profession, the selection process to the career still commands a healthy selection ratio. In a country with 18 languages and 22000 dialects, English continues to be the language of business and government.

e) Indians are generally law abiding and obedient.

f) They are ambitious and wish to rise up the ranks as fast as can.

g) Indians are said to be expensive; but ask the experienced companies who look at not only the wage cost alone, but also factor in expenses on extra superintendence, workshop and technical help, cargo claims, damages and losses. Then the story is very different.

h) India is a proven intellectual capital base.

It is in this context that I take the example of my institute, The Academy of Maritime Education and Training (Amet), now a Maritime University; whose core competency lies in Pre-Sea training for officers and which has emerged as the pioneer, leader and trend-setter in the Global Maritime Education and Training arena. In existence for 15 years in the private sector, even 5 years before the Indian Government opened up maritime education to private sector in the country; today we have the world's best brand in shipping, the A. P. Moller – Maersk Group partnering with us in a very big way, which pattern is being emulated the world over. Amet now has been declared as the first Maritime University in the very strict education regime of the country.

Truly a barometer and a reference point for Global Maritime Education and Training – Amet's academic profile overview will in effect cover the subject in its entirety.

THE INDUSTRY RESPONSE

The shipping industry is the strongest cog in the wheel of the world economy, and it is important that this industry, which is of fundamental importance to world economy, has adequate supply of well-trained manpower. The industry – generally speaking, has not given enough priority to human resources. It is easy to build ships today, but building high quality crew takes lot more time and effort. 3 – 5 years for junior ranks and 8 – 9 years for senior levels.

Today, a major initiative is needed for developing Maritime Education and Training at industry peak bodies to enthuse a strong commitment to training by the industry. Small and medium size ship operators with less than vulnerable fleet size, increasingly rely on poaching from markets rather than investing in developing their own talent pipelines. They find it cheaper to pay slightly more and poach trained resource rather than invest in training. It is imperative that industry invests in identifying and honing their tomorrow's leaders. Throwing more money to manage talent shortage in the supply-starved market is never going to be good solution. This may well be the biggest difference between the winners and the laggards.

THE HR IMPERITIVE

Further, to aptly compliment Quality training, it must also be realized that innovation is also needed in delivering optimal performance at shipboard levels. After all, the ultimate goal of MET is to deliver in performance.

Crew performance is a function of individual capabilities, management policies, cultural factors, experience, training, work environment, and countless other factors.

Matter-of-fact, the "human element" is really a complex, multi-dimensional issue that affects maritime safety and marine environment. It involves the entire spectrum of human activities performed by the ships' crew, shore based management, and other relevant parties, all of whom need to cooperate to address human element issues effectively.

And to make this happen, there is much of training needed at Management areas on shore. We can devise all sorts of training for that seafarer, but, of what effective use is it, if the employee does not fully engage himself in delivering his optimal level, being restrained and pulled back by the poor HR practices of the organization.

One of the popular practices is that, it takes nothing less than a Mariner, if not a Master Mariner, to head the HR functions of the shipping company.

With due respects to his seamanship abilities, unless he is properly trained, he is about as proficient at this job as a fish is at carpentry.

It is not just about filling vacancies.

Today we need specialized skills of sound HR practices to bring this function on par with contemporary industry practices.

Mariners who are trained in modern, contemporary, HR practices.

Active engagement of employees in their jobs and work becomes almost mandatory for shipboard operations.

Certainly unhappiness contributes to disengagement, which in turn lowers productivity.

Engagement is about motivating employees to do their best. An engaged employee gives his job and his company his 100 percent. This makes the difference in an industry where the most valuable resource is really the ships staff.

Moreover, in times of wavering loyalty, employee engagement is a powerful retention strategy. The fact that it has a strong impact on the bottom-line, adds to its significance.

In this equation, we must also consider the effects of fatigue, boredom, health, familiarity, carelessness, family problems, pressure to meet schedules, ergonomics and confinement, which all play their part in accidents and incidents.

I am afraid, unless the HRM issues are adequately addressed by the companies, we will continue to have intelligent, well-trained, highly skilled and experienced professionals making critical mistakes – notwithstanding technological advances been designed to reduce these.

THE ENHANCED SCOPE OF MARITIME EDUCATION

The time has now come, some may say it is already too late, to re-define our scope and limits to what we call as "Maritime Education and Training".

Whenever we refer to Maritime Education and Training, globally, invariably, almost taken for granted, the limits get automatically defined to Shipboard competencies.

With tremendous growth in various sectors of shipping, as well as newer opportunities emerging globally, there is an urgent need for qualified and skillful manpower to be able to sustain this growth, if not drive the growth.

We, being considered leaders in Maritime Education and Training, naturally this mantle too falls on us, to be able to innovate and respond to the needs of the other allied sectors of shipping that is growing so fast, be it Ship building, Ports and Terminals, Supply-Chain and Logistics, Off-shore, and maritime support services.

We must remember that more than 50 % of the jobs are not invented as yet. As the industry evolves, newer skill sets come into being. We need to connect with the industry and be a solution provider rather than a stand-alone educational institution. Source, train and supply manpower, that is job-fit.

Since last couple of years, Amet has taken a strategic choice of creating multiple drivers of growth, leverage opportunities in the emerging Indian economy that best match our proven internal capabilities as well as beyond. Consolidation of our leading position, raising the academic profile, capacity building, distributed leadership etcetera meant a paradigm shift in the governance mind-set to realign to the new focus, un-learning the past archival model of operation.

In doing so, we may have to challenge existing paradigms, thus drivingchange rather than just responding to it.

2008 was a momentous year for us. The prestigious Lloyds List award, the University status, Excellence award from Indian Maritime Administration, etcetera, conclusively demonstrated the robust fundamentals underlying our growth momentum.

As the first University in Maritime Education, we realize, that we have achieved in providing that fillip, which was so much needed in this country. As a University, we now have the necessary empowerment to be quick inresponding to the needs of human capital requirements of the global shipping industry. These include Graduate degrees in Naval Architecture and Offshore Engineering, Harbour Engineering & Off-Shore Technology, Applied Marine Information Technology, Petroleum Engineering, Electrical & Electronics Engineering-Marine, and Shipping and Logistics Management.

The Post Graduate programmes are specifically customized for seafaring officers like M.Sc. Degree in Maritime Fleet Operations Management and M. Tech. Degree in Marine Engineering Management. The Senior Officers on board a merchant navy ship, are the principal officers who are responsible for the efficient management of the ship which is the de facto profit center of a shipping company, albeit, at a micro level of operations. It can therefore be said that these officers are good managers of a shipping company at the micro level. But if these officers aspire to take up senior level positions ashore in the marine industry, their technical as well as managerial skills need to be upgraded.

Other Post Graduate programmes include Management degree in Shipping & Logistics, Shipping Finance and Marine Human Resource Management.

PhD. Doctoral programmes are also commenced in the Research Disciplines of all marine related areas.

Caution!!!

If we continue to do the same way, we will continue to get the same result!

THE MET INSTITUTIONS IN THE FOREFRONT TO REALIZE THE IMO MOTTO „GO TO SEA CAMPAIGN"

Jerzy Listewnik,
Prof., Maritime University of Szczecin
E-mail: marli@am.szczecin.pl

Abstract. The paper concerns issues, which are crucial with far going unforeseeable consequences namely the quite rapidly declining number of officers engaged in and attracted to a maritime career, particularly in seafaring. The occurring shortages of qualified maritime professionals, especially in seafaring as well as in onshore maritime activities are according to the IMO secretary an increasingly serious impediment to maritime development in the world connected at the same time with fast growing world fleet. Further the EU Green Paper entitled "Developing Europe's Maritime Skills and Expanding Sustainable Maritime Employment" is considered. The basic task of the paper is focused on the issue how the Universities and other to conduct the recruitment of young people to be successful in attracting the youth for a shipping career. Finally a professional career progression in maritime transportation is proposed.

1. INTRODUCTION

Today we have a perfect case of the market beginning to act and a realisation that supply has been overtaken by demand this statement concerns the availability of crews for the continuously rising number of ships. Good experienced, responsible and prudent seafarers are becoming like hen's teeth.

The global shortage of seafarers, especially officers has already reached significant proportions and is now a source of genuine concern to all involved in the maritime industry.

The demand for raw materials, finished products, energy and luxuries is growing year-on-year, in line with the requirements of global trade and it is not expected that the current financial crisis to have a very serious impact on the volume of at least, the basic commodities transported by sea.

The demand has been, from time immemorial, satisfied by the international shipping industry, which today transports 95 per cent or so of the world's commerce safely, efficiently and at a fraction effecting the environmental impact and cost of any other form of bulk transportation.

Without ships or better stated without the seafarers to man them – one half of world would freeze for lack of the fuel to heat it and the other half would starve for lack of the grain that gives it its daily bread. A complete indication of just how serious the manpower shortage is becoming is given by BIMCO (The Baltic and International Maritime Council), by Drewry Shipping Consultants or the Seafarers' International Research Centre (SIRC) in Cardiff as well as other institutions SIRC assesses sees a manpower crisis in European shipping, a crisis that will decimate global standards unless radical action is taken. European seafarers may be a thing of the past as soon as 2010. Drewry Shipping Consultants assessed the current shortfall of officers in the global fleet to be some 34,000, against a requirement of 498,000. Moreover, assuming officer supply continues to increase at current levels, the report predicts that by 2012 the officer shortfall will have risen to 83,900.

BIMCO/ISF Manpower Update in 2005 had assessed the officer shortage to be 10,000 with the shortfall rising to 27,000 by the year 2015. Anyway the general message is clear: we are fast approaching a crisis situation.

Over the last few years, shipping has enjoyed a period of considerable expansion – so much so that at the beginning of 2007, the world fleet reached 1.04 billion deadweight tons.

Thus there are still serious concerns over the supply of manpower for the huge number of newbuildings scheduled to come on stream – in this and the subsequent years. One estimate has assessed that about

400,000 seafarers and 45,000 new officers would be needed to crew the 10,000 vessel forecast to join the global merchant fleet in the next three years.

Such growth has exacerbated the scarcity of human resources, both in terms of seafarers and among those who provide the shore based technical support on which the shipping industry relies (marine superintendents, harbour masters, maritime pilots VTS and SAR personnel and other. And as these people are almost entirely drawn from the seagoing, the campaign "Go to Sea" should be focusing on the need to attract seafarers into the professions – and retain them as long as possible thereafter. The issue has both quantitative and qualitative aspects. Purely in terms of numbers, while the point has not yet been reached when ships are unable to sail and cargoes remain on the quayside, it will become an increasingly real prospect as the shortage increases – unless we act with due haste, methodically systematically and consistently. (Efthimios E. Mitropoulos [2]).

Some of the shipowners are complacent not doing enough training, because they can buy labour from other countries where they do not have to pay any labour costs. But this may be a bitter disappointment. This was some years ago today all those fine Indian and Filipino officers who supposedly would fill the breach after the old chaps faded fast away leaving a serious gap behind them, are not hanging around for a full sea career, as did their predecessors, but leave the sea the instant they have accumulated enough savings sufficient to make the break. Quite a number of them do not wish to be promoted to senior officers' ranks, as they are aware of the price of these responsibilities, thinking it is not worth paying for health reasons among other factors.

Currently, the shortfall of officers seems to be absorbed by the existing workforce – but not without recourse to some excessive measures. According to reports, officers are working longer hours and occasionally, not taking their holiday entitlements.

Some are awarded exemptions to enable them to serve in positions for which they may not be fully qualified. Training periods are being shortened, hastening the early promotion of younger seafarers, who may lack the necessary experience to shoulder the responsibilities of higher ranks. Ships may receive short term permits to sail with fewer than required minimum crew complement.

Meanwhile, the demand/supply imbalance is forcing salaries up, which has the effect of enticing older officers out of retirement, thus raising the age profile of the workforce and giving rise to some undesirable developments.

The small or larger deficit of officers may already be posing a threat to the safety of life at sea since it has been seen over the past few years that there was an increase on board ships of the number of people with false certificates of competence who are probably filling the officers gap. Some over 12,500 cases of forgery in certificates were revealed by a study in 2000 (IMO [5]).

The realistic "bench mark" scenario (see Fig. 1) considers the observed historical growth rate of the number of ships in the world fleet in past decade at 1 %, today it may have reached even 2 to 3 % and assumes that recruitment and wastage levels are the same experienced over the last five years. Although the forecast is quite sensitive to a number of factors, the clear message is that the present shortfall of officers will worsen unless wise and prudent action is taken.

To overcome the predicted manpower shortages (Bucknall and Freire [1]) propose unmanned cargo ships as a vision in 2020. In their paper the results of a technical and economic appraisal of a fully automated unmanned cargo ship are presented within the context of expected world developments in the next decades. With all respect to the elaborate technical level of this paper, the realization of the proposed unmanned ship concept described in it is not for a professional and experienced marine engineer a viable one, no matter what level of technology we reach in 2020. Thus we have to find still another solution remembering that the most important people in any shipping company are the seafarers; they are taking care of the assets, they are to solve the problems, they are where the problems are, they meet the customers, they must be on the ship.

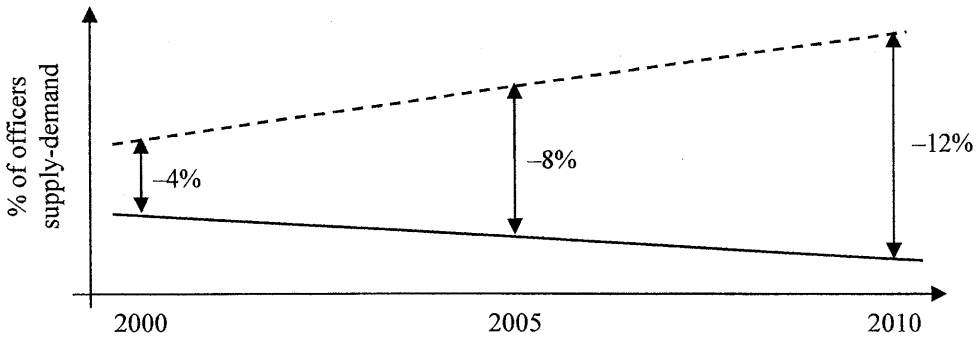


Fig. 1. Predicated supply-demand gap for officers (ISF/BIMCO [6])

2. FUTURE MARITIME POLICY OF THE EUROPEAN UNION

In the issued by EU Green Paper entitled "Developing Europe's Maritime Skills and Expanding Sustainable Maritime Employment" the Green Paper bemoans the declining number of Europeans engaged and attracted to a maritime career, particularly in seafaring. The paper indicates, that the resulting shortages, both in seafaring and in onshore maritime activities, are an increasingly serious impediment to maritime development in Europe as well as worldwide.

WHY we have an insufficient and declining number of young European and not only, men and women who are attracted to a maritime career, particularly in seafaring? What, if anything, can be done to reverse the evident downward trend and make the choice of maritime career more attractive for qualified young European and other worldwide?

The EU Green Paper whose basic purpose is to raise the issues and provoke discussion, also makes some suggestions for change such as the raising of the general standards of maritime education and training (MET) and of providing present and future seafarers with additional knowledge and skills that would enhance their employability **outside** seafaring, that is, in shore based maritime employment or other industrial sectors.

This raises the question of whether the existing system of MET-indeed, our existing approach to MET is capable of achieving this, and whether changes in MET alone are sufficient to make seafaring again an attractive "career choice" for young Europeans as well as other nations.

There is an urgent need of revamping the existing still in some universities and colleges methods of lectures and exercises. The students should be activated more and lecturers should put a lot of effort in order to pass a maximum of useful knowledge and skills without repeating of what can be read in the textbooks.

The study courses in the maritime universities and colleges should therefore be conducted by using an active teaching method, corresponding with the most effective known in the world solutions in the domain of education. The largest advantage of this method is a simultaneous passing on to the students of knowledge and practical skills, thanks to this they hold and advantage compared with students from other universities. It seems that some of the MET maritime academies live in a kind of isolation from world shipping developments and trends.

One of the most important elements of the education process are **case studies** concerning operational problems of ships like various casualties, breakdowns of machinery, careless navigation etc. All mentioned case studies are now enumerated in reports by various organisations like UK Marine Accident Investigation Branch (MAIB), Classification Societies banks of serious damages Lloyd's Register, German Lloyds, BIMCO, Alert Bulletin and other. This case studies collected by various organisations mentioned are an invaluable source of ships operational experience and problems, second to none with any textbooks, completed by proper usage of available today's latest generation simulators potential, we shall have a mature and well prepared ship's duty officer. Therefore conducting of traditional lectures should be given up except may be during first year where some theoretical aspects of various subjects should be highlighted. The lectures in next study years should have a seminar and workshop character, thanks to it; it is possible to utilize the experience of all participants. The students can work in small groups of few students. The condition of effective participation in the classes is a good earlier preparation for the classes.

The prestige of idea and not the idea of achieving prestige is possible if in the university exists a partnership between the lecturer and student. The lecturers perform roles of advisors and not of the arbiters. They are the guides encouraging to independent thinking by creating a creative atmosphere. Thanks to its students are not afraid to ask, seek out demand; they can also consult each lecturer specializing in a specific problem and not only the person conducting classes.

3. HOW TO SOLVE THE RECRUITMENT PROBLEM – BASIC CONSIDERATIONS

The image of shipping industry is not good in the eyes of the general public, who rarely hear of any good news stories. Instead, they are informed of ships in difficulties in stormy weather, of freak waves, of groundings and of the subsequent pollution and its effect on the environment.

They may be told about acts of piracy that are taking place in various parts of the world, and occasionally, they may hear of a shipmaster being thrown into jail for some alleged misdemeanor on the high seas.

Those who are conversant with the various maritime 'blogs' on the internet will have read messages berating the state of shipping, and specifically life at sea today. There will be comments about overregulation, too much paperwork and the increasing number of inspections about reduced manning and the problems of fatigue; and some shipowners who do not care for the seafarers, and who do not reinvest their profits in the human element. None of these are positive images of the shipping industry, although some of the less complimentary comments are perhaps based on perceptions rather than fact. Yes there are unscrupulous employers, there are ships that should not be at sea and there are seafarers who are badly treated. As stakeholders in this industry, we should all work towards promoting the positive side of shipping – it is not all 'doom and gloom'. We need to fulfill the expectations and aspirations of the new generation of seafarers, such that they will have the motivation to do the job well and a commitment to a full career in the shipping both afloat and ashore.

For the development of crew shortages we can partly blame the shipowners themselves. The shipowners used to regard their crews with the same feelings as they did luboil, fuel or paint – as a necessary evil which they sadly should not do without – suddenly recognising that seafarers were actually human beings. Ship managers, companies should have a vested interest in proper training, because for them the crew is the basis from which they start to do the business. Training is an investment that the owners have to participate in, and should be aware of it.

Thus the universities, colleges should seek close relation with ships especially in large companies, for which they will do the selection, will do the training and competence building, but as already said the owners need to participate and invest in this by for example offering already the first year students a scholarship.

The universities in turn should start an even aggressive and powerful students' recruitment promotion for particular shipping companies so a candidate for a study course in the university should know in advance his future environment and work place. Thus closer cooperation between the universities and big well-known shipping companies should be established. Errors which are done during the recruitment process are mainly the delayed actions in enlisting, if we visit the schools and try to recruit the last class high school students few month before they complete the high school, it usually will be to late because they have already made up their mind what they would like to study, so we should rather address the younger classes giving them some food for thinking about their future.

On a general note a professional mariner wonder how can an industry that carries more than 90 % of world trade be, to all intents and purposes, invisible? How can people take completely for granted the vast and intricate maritime distribution system that feeds, fuels and services our modern world? Perhaps very easily, in that we are only interested in what shipping delivers, rather than how shipping works. And that is rather sad, in that people in that people in the shipping industry know that they are part of an amazing, essential and international industry. We at the universities and colleges wish that it was not so far from the consciousness of the man and woman in the street, who only ever think about ships, when the media tell them that one has sunk, spilt oil or was attacked and taken by the pirates.

A tool for the general public has been fortunately created by BIMCO (Grey [3]). BIMCO decided to use the facility of the World Wide Web to try and address this widespread ignorance of our industry. BIMCO Seascapes was devised, quite simply to become a useful general source of information on contemporary shipping, maritime topics and current maritime industry issues. It was designed for ordinary members of the general public who might have a specific question to answer, or a wish to inform themselves better.

It would be hopefully useful for perhaps schools and colleges, for teachers and others seeking rather sparse teaching materials about the shipping industry. It would be pitched at the level of "an intelligent 15 year-old and upwards, with the emphasis in interest and accessibility (Grey [3]). It would assume no prior Knowledge, avoid the jargon and "shipping speak" of industry insiders and professionals.

To help to understand what a sea and sea life is programmers already in the public schools should cover it in quite range. This would essentially assist later the recruitment and as a matter of fact be already the beginning an early one of the real recruitment by the university.

Seascapes would confront issues, honestly and objectively. It would answer questions that general public might ask, even though the answers might be uncomfortable for some. But above all it would convey some of the excitement and fascination of ships and the sea, trade and marine technology. Seascapes would answer the question – **why**? which is the universal question we all ask when we are confronted by something we do not know! It's quite obvious that in the recruitment campaign the universities, colleges and other training institutions should follow the deviced by BIMCO Seascapes.

Another important argument in the recruitment campaign, which the educational institutions should bring forward, is the coming introduction of the International Labour Organisation Maritime Labour Convention 2006 (MLC 2006) which marks a significant development in international shipping. Described as a 'bill of right' for maritime labour and as the 'fourth pillar of maritime legislation' both terms reflecting that the MLC, 2006 is extensive both in its application and scope in addressing maritime labour related issues with the objective of improving the standard, safety and status of shipping.

The convention has been drafted to help ensure that all seafarers, regardless of their nationality and the flag of the ship, receive acceptable working and living conditions.

Lloyd's Register believes that the MLC 2006 will have a direct and positive impact on both crew recruitment and retention, and most importantly maritime safety – a key issue for all those involved in shipping. The new convention sets minimum standards on issues such as conditions of employment, accommodation provisions, recreational facilities, food and catering, health and safety protection, medical care, welfare and social security protection. Detailed requirements of the convention aim to tackle issues associated with the causes of fatigue, occupational accidents, recruitment, employment opportunities and working and living conditions for an estimated 1.2 million seafarers.

The new International Labour Organisation Maritime Labour Convention 2006 – the "seafarers' bill of right" it has been called is now looming over the horizon, something that is very bit as important as was the ISM Code. It could just about be ratified by 2010 and come into effect a year later, or perhaps 2012, if we are unlucky. Which in the scheme of things, is not that long for about 70,000 ships and a million and a half people who work in them to put their ducks all in a line. One in the shipping business may think it's only another one more paper. But he could however be very wrong in this estimation, as documents supporting the MLC, which must be carried aboard every ship, once it is in force, amount to a "trading certificate", without which the ship is highly likely to be detained by port state control. It is also by no means "just" a paper exercise, and ships are likely to be physically inspected, and those aboard interviewed, to ensure that the reality of that ship matches up with Declaration of Maritime Labour Compliance and the Maritime Labour Certificate.

The MLC 2006 can be now a very powerful tool in the recruitment process. Through the involvement of educational institutions, the youth can be made aware of the importance of the industry and the vast career opportunities available in shipping. It is encouraging to note that the MLC 2006 content can sustain the seafaring profession, seafarers must be valued and treated with respect, and this should be distinctly passed during the recruitment process by the universities to the young people – maybe candidates for a shipping career. There is a need for a much longer term strategy to reach into the hearts and minds of the youngest generation – Generation M who are currently entering school. Greater interest should be shown for visiting schools to help educate and provide practical applications about international trade and business which, by extension, includes seafaring – thus exposing these young minds to a profession that prepares them for multiple jobs and careers in an interesting and dynamic industry.

More attention should also be focused on how to engage Generation Y [*www.he-alert.org/documents/published/he00760.pdf*] – those born between 1978 and 1994 – about opportunities seafaring can provide. It is well worth looking at *www.shiptalk-jobs.com/survey_results*, if manpower is a current concern. Shiptalk Recruitment simply invited people on their books, or who look at their website or take the Shiptalk newsletter to complete a questionnaire, so the group which answered might be considered self-selecting. There were 229 respondents, mostly mature and largely senior officers with long sea service and with UK, Russian, Indian, Swedish and Americans forming the largest percentage. More than one in four were over 51, half were over 40, a very large number married with children.

The most important part of this research might be considered the most negative in a table which listed in order of importance the worst aspects of a career at sea.

It is worth to reproduce this list: (Grey [4])

1) long time spent apart from family and friends – 67,6 %;
2) oo much paperwork – 34,1 %;
3) time spent away from children – 29,7 %;
4) fatigue – 22,3 %;
5) fear of being treated like a criminal – 19,7 %;
6) onboard living conditions – 18,3 %;
7) difficult to keep in contact with home – 17,5 %;
8) lack of shore leave – 15,5 %;
9) crews too small to share workload – 14,8 %;
10) few carrier opportunities – 10 %;
11) loneliness – 9,6 %;
12) concern about accidents at sea – 7,9 %;

13) lack of onboard recreational facilities – 7,9 %;
14) no privacy – 4,8 %;
15) piracy – 4,4 %;
16) bullying – 0,9 %;
17) ack of respect for me religion.

There was a huge amount of additional information. However I think we should focus upon this table above, because fundamentally it is these issues concerning sea life that will need to be addressed if we are to crack the manpower conundrum and attract and retain the people we need. One might quibble about the relatively small number of respondents (although it is a perfectly respectable number) and wonder perhaps, if more young people would have given very different answers, or offered different priorities, if they were half the age, unmarried and without responsibilities of their senior officers.

But the point about the items on this list is that it provides a target of things that can be done to address these negatives. We might look at the length of tours and leave ratios. Certainly priority might be given to ensuring that there is cheap and readily available communications, for we have younger generation obsessed with connectivity who just won't tolerate that of the past, when agent's boat was the sole equipment available. There is plenty that can be done about the living conditions and recreational facilities – just going back 30 years to the best ship of that era would teach us plenty. But it is clear that if we are to properly address the manpower shortage, which is now being faced by the whole industry, the charms – and more importantly the horrors – of a life at sea need as much attention as we give to the employment of our busy ships.

There is a great role to be played by the teachers and instructors in the universities and colleges as far as recruitment as well retention is concerned in this case The International Labour Organisation Maritime Labour Convention 2006 (MLC 2006) marking a significant development in international shipping can contribute immensely to the recruitment problem if the educational institutes during visiting secondary schools and during lectures in the universities can provide the basis for a fulfilling and satisfying life long career or that seafaring would provide them with the necessary experience and qualifications for a related job ashore. *Life At Sea surveys – www.shiptalkshop.com* have undertaken to discover exactly what serving seafarers think about their lives and jobs afloat while obtaining up-to-date perspectives on the issues of most concern. The surveys are still going on and the findings give an important route map for anyone especially for the universities looking to attract, retain or manage people at sea. It is also worthwhile to mention that the preliminary revised text of chapter of the International STCW Convention is introducing Electrical Officers what means a ship personnel qualified to perform all tasks related to the maintenance and efficient operation of ship's electrical machinery and power equipment such as the ship's distribution system, alarm and monitoring system, main propulsion generators, propulsion motors, ship's service generators and emergency generators.

Thus universities curricula should be well prepared and enhance the knowledge of electrical technology to be able to educate the soon in the future coming electrical officers' ranks.

4. PROFESSIONAL CAREER PROGRESSION IN MARITIME TRANSPORTATION

A professional career in any field of human activity has two basic features: first, competency based on advanced education and special training; and second the expectation and possibility of life-long work and progressive advancement in one's chosen field of activity.

Today a decreasing number of young people consider and pursue seafaring as a long-term professional career. And the experience from seafaring, no matter how good and extensive provides only limited choices and opportunities for mid career transition to professional onshore employment in the maritime industry or outside it.

If you leave the sea and go ashore you generally have to start all over again building a new career for yourself and your family. Being at sea for rather a short time like 5 – 10 years may change your situation for a better case.

In order to attract young people especially Europeans again to seafaring, and to a life-long career in the maritime sector in general, I think our efforts should be directed towards what shipping delivers and how shipping works. And this is rather sad, in that people in the shipping industry know that they are part of an amazing, essential and international industry.

In this case the MLO 2006 convention is a very valuable input into the seaman's life style at sea wiping the majority of the job dark aspects.

Thus our efforts should be directed towards following matters:

- creating a pattern of professional education integrating a university first degree, professional training, work experience, professional registration and the option of higher degrees, along the same lines as other professions such as medicine, civil engineering, architecture, law and so on;
- create a pattern of professional career progression integrating seafaring and onshore employment into a life-long progressive path that offers age appropriate career choices, post experience higher university degrees and senior management positions.

The attached graph, Fig. 2 (Laubstein pers. comm. 2007) outlines the main features of a possible system of integrated professional education and career progression combining at – sea and onshore maritime employment. The essential requirements of such a system would be:

- upgrading of MET instruction and qualifications to full university status at the (B.A. or B.Sc) level: raising of academic standards; broadening of curriculum to include non MET subjects (e.g. law, economics, finance, human resource management, logistics of marine transport etc.); recognition and acceptance of such a degree for admission to postgraduate studies (i.e., portability of the degree in the higher education milieu, consistent with the Bologna process in European higher education);
- accessibility to, and financial assistance for mid – career postgraduate studies in different specializations of maritime affairs or other maritime – related subject at the Master level (M.Sc or MBA);
- employer sponsorship of transition from seafaring to onshore employment in professional positions in maritime administration, industry, MET institutions and various maritime services (classification societies, P&I clubs, Seamen Unions, etc.).

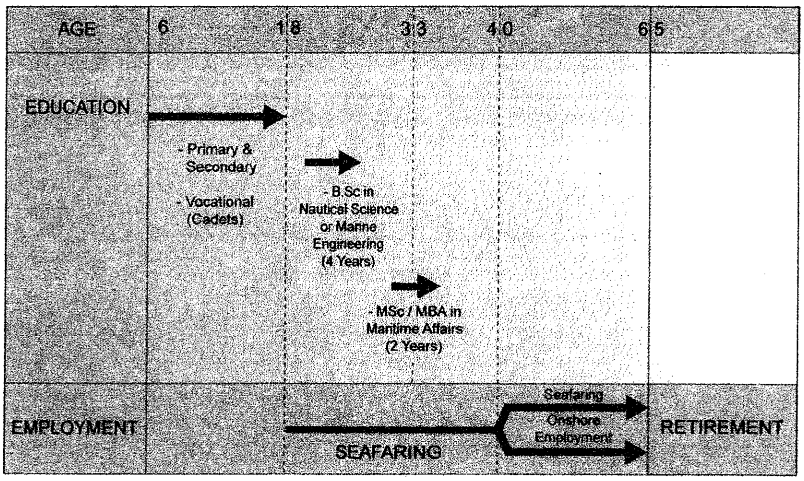


Fig. 2. The maritime professional: education and career progression (Laubstein pers. comm. 2007)

This all amounts to a move towards increased professionalization of the maritime transportation sector based on university-level education standards and qualifications in line with standards and developments in other major industrial sectors. This would raise the status and career prospects of maritime professionals working both at sea and ashore, enhancing the employability and mobility both within and outside the maritime sector.

The transition from seafaring to onshore employment requires obviously forward planning by employers to integrate officer with postgraduate qualifications into appropriate senior management or technical position in their organizations. Ideally, there should be some kind of contractual arrangement between officer and their employers, which covers both the postgraduate studies and the move into onshore professional positions. Most probably this would include certain binding commitments by both the employer and the employee.

5. CONCLUSIONS

Fewer and fewer young Europeans and not only, seem to be attracted to a career in the maritime sector and particularly not in seafaring.

Quite obviously, nowadays seafaring is not an attractive choice of a professional career compared to the opportunities open to ambitious young people in other field. One of the reasons could be the long time period before the young man can reach the senior posts i.e. a master or chief engineer. The solution in this case could be a fastrack scheme in Europe (Lane [7]) to promote appropriate candidates to senior positions in their mid twenties. Experts in European countries should advise what is necessary in their view as far as an additional training between 20 – 25 years is concerned. The training should take the form of short courses and distance learning, a demonstration project having a European Community subsidy is under way. Some may think that a lack of experience may well be the major stumbling block for any plans to fastrack individuals, no matter how talented, into senior roles. Of different opinion is Professor Lane who points out that in the Second World War 40 % of German submarine commanders appointed between 1937 – 45 were aged between 20 – 25, and 70 % were appointed under the age of 30. And this was not purely a wartime phenomenon. There were plenty of very young people as senior officers among American merchant ships as well.

I served myself with a 25 years old captain on the Singaporean Neptune Orient Line Shipping Company's "Neptune Saphire". In this company promoting young Singaporeans to top ranks was a general rule. There is a believe between people that to be in a senior position such as a chief engineer or captain one has to be old and wise, but you can also be old and foolish. I believe that creating a young men a perspective that already at 25 being at the same time a holder of a M.Sc. degree he can command a ship worth of billion dollars should be very exciting and stimulating as it would be very difficult for him to reach such a highly responsible position onshore. He may further speculate that after 5 years of sea service he will be still 30 and would not have any problems getting an onshore job in other branch of the maritime industry, starting as well a decent family life.

Thus we have to explore ways and means to make the "maritime career" a more attractive choice for young Europeans and other nations. A 25 years or so old captain or chief engineer are a good and tempting example.

The proposition put forward here is simply to try an approach, which both raises the MET educational standards of maritime employment and integrates seafaring and onshore employment.

There are many choices for young people. The answers to the problems of recruitment and retention of seafarers are clearer than we assume – the real challenge is how we package the job prospects and career opportunities to address the needs of Generations Yand M.

ACKNOWLEDGEMENT

The assistance and suggestions of Dr Karl Laubstein the President of World Maritime University (WMU) during personal contacts in preparing this paper is greatly appreciated.

References

[1] Bucknall R. & Freire P.: Unmanned cargo ships: a 2020 vision. Journal of Marine Design and Operations No. B5, 2003, pp. 57 – 68.

[2] Mitropolous E.: Alert. Issue No. 19 January, 2009.

[3] Grey M.: Seascapes – a widow on our maritime world. BIMCO Bulletin, Volume 102, No. 4, 2007, pp. 30 – 31.

[4] Grey M.: Who will shoulder the burden? Lloyd's List, March 31, 2008, pp. 8 – 9.

[5] IMO News, Issue 1, International Maritime Organization, 2001.

[6] ISF/BIMCO, 2000 Manpower Update – The Worldwide demand for and Supply of Seafarers. International Shipping Federation, April 2000.

[7] Lane T.: Count down to extinction. Marine Engineering Review, July/August 2003, pp. 34 – 35.

THE ROLE OF STATE-OF-THE ART TECHNOLOGIES FOR DEVELOPING A MODERN ORGANIZATIONAL CULTURE IN MARITIME SAFETY AND SECURITY MATTERS

Boyan Mednikarov,
Capt. (BuN) DSc, Prof.
N. Y. Vaptsarov Naval Academy
Kalin Kalinov,
Cdr, PhD, Associated Prof.
G.S. Rakovski,
Defence and Staff College – Naval Department
Nikola Stoyanov,
LCDR, Assistant Prof.
N. Y. Vaptsarov Naval Academy.
E-mail: bobmednikarov@abv.bg or va_vms@yahoo.com

Abstract. Ship crews have a specific organizational culture which is formed mainly in the process of education and training. The safety and security aspects of this culture have a key stone role for the career development of the future maritime officers, a fact which is confirmed by the current policy of the IMO. Assuming, on the one hand, that modern maritime personnel education and training relies strongly on virtual environment, and on the other – that maritime safety and security environment (MSSE) remains highly dynamic, hard to predict and is dominated by the inherent subjectivism of the human factor, the question of "Is it possible for high technologies to contribute to the establishment of an organizational culture adequate to the specificity of the MSSE" is of particular interest. On the background of the recent dimensions of the MSSE, the study discuses the "pros and cons" of maritime education and training in a virtual environment and formulates approaches for using state-of-the art technologies for developing a modern organizational culture in maritime safety and security matters.

"Nothing is more practical than good theory"

Professor A. Shutko

I. INTRODUCTION

Performing their duties in a specific environment, ship crews have a specific organizational culture which is formed mainly in the process of education and training. The safety and security aspects of this culture have a key role for the career development of the future maritime officers, a fact which is confirmed by the current policy of the IMO. Assuming, on the one hand, that modern maritime personnel education and training relies strongly on virtual environment, and on the other – that maritime safety and security (MSS) environment remains highly dynamic, hard to predict and is dominated by the inherent subjectivism of the human factor, the questions of "Is it possible for high technologies to contribute to the establishment of an organizational culture adequate to the specificity of the MSSE" and "Which aspects of the crew's organizational culture are subject to formation through simulations" are of particular interest.

Before discussing the "pros and cons" of maritime education and training in a virtual environment and formulating approaches for using state-of-the art technologies for developing a modern organizational culture in MSS matters, it is necessary to present the particularity of the ship crews' organizational culture.

This approach, in turn, is to be based on proper definition of the term "organizational culture".

II. DEFINING THE TERM "ORGANIZATIONAL CULTURE"

It should be noted that a diversity of definitions for "organizational culture" exists currently. The major part of the definitions is focused predominantly on the psychological aspects of the collective functioning of the organizations. Classically, this type of definitions associates the organizational culture with collective knowledge and presents it as an "organizational opinion", an aggregation of commonly adopted beliefs which are reflected in traditions, habits and even - in more tangible forms: existing "legends", symbology, and some items of the traditional organizational equipment and products. The more significant the interpretation in the organizational functioning, the more tangible the organizational culture's attributes [3, p. 39].

Despite the correctness of such an approach, of more important interest for the study is the "systematic" aspects of the term "organizational culture".

In this context, the definition given by Edgar Schein provides a suitable basis for studying the particularity of the ship crews' organizational culture: "*a pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way you perceive, think, and feel in relation to those problems*" [4].

It is appropriate to make some additional explanations.

Classically, the organizational culture is considered to be a "derivative" of the structure of a system. It means that the specific trends of the structure are reflected by the peculiarity of the organizational culture. Taking into account that the structure is a "dialectic trinity" of the structural aspects: the composition, the connectivity, and the relations, the organizational culture is influenced by the three structural aspects. In this context, two conclusions, a theoretical one and a practical one, are of importance for the study:

The theoretical conclusion is that the organizational culture is formed spontaneously and relatively independently of the system designer's will.

The practical conclusion is that the peculiarity of the organizational culture is to be considered to be a result of the specific trends of the structural aspects and logically – in any case of a particular organization the organizational culture is to be studied on their background.

As far as the practical conclusions concern the next part of this paper, let us turn our attention to the spontaneous formation of the organizational culture. One question is of particular interest: "Does the organizational culture emerge relatively independently (and some time – in defiance) of the system designer's will, what is the purpose of the organizational culture?".

The "bearers" of the organizational culture are the system's components. In fact, the organizational culture reflects their motive to withstand (or to overcome) the inner system dynamics and the possible unpredictability of the interaction. In this context, the organizational culture serves the purpose of achievement and maintenance of inner system stability and it is a result of the typical for any system "aspiration for negentropy (negative/counter entropy)".

The most appropriate way of system stability achievement relies on:

- institutionalizing the connections and relations;
- prioritization of the alternative connections;
- standardization of the relations among the system's components.

Taking into account that the "bearers" of the organizational culture are the system's components, the practical dimension of these three directions of system stability achievement is the understanding that organizational culture is a "general protocol" for interactions among organization's components in the process of the organization's purpose orientated functioning.

Assuming such an understanding, we can go further and state: although a single system's component is the "guardian" of the adopted organizational culture, its real "beneficent" is the collective (or – the organization) as a whole. Being relatively subordinated to the functional aspect of the system, the structure generates the organizational culture as a specific tool, serving the purpose of managing the possible fluctuations in the system functioning. In other words – consciously or not, the organizational culture supports the process of system adaptation but not each of its aspects. Something more – in many cases adherence, to outdated traditions and routinism could impede the organization from adapting to the dynamics of the environment.

It is of particular interest, which the supported by the organizational culture adaptation aspects are.

Firstly, the emergent nature of the organizational culture suggests that it needs time to "sift out" alternative protocols of interaction and to establish traditions. This fact prompts the following conclusions:

- the organizational culture is an attribute of "mature" organizations;
- the environment of functioning in a relatively static (smoothly changeable[1]) and/or to its dynamics – of changes possesses cognizable cycles;
- the goal (goals) or the process of system functioning possesses repeatable trends or activities.

Summarizing the conclusions, we have to recognize that the organizational culture brings for optimization and the idea of adaptation is to preserve the routine performance of an organization in cases of "replacement" of components.

The next aspect of adaptation supported by the organizational culture is related to the potential emergency of "improper" behavior of a system component. The problem in the case is what behavior is considered to be "improper". Basically, any deviation from the routine (when such a routine is applicable) is classified as being irregular. In similar situations, the organizational culture supports adaptation to internal processes of instability by the way of not tolerating deviations and suggesting mechanisms for their compensation.

Without claiming completeness in studying the correspondence between the organizational culture and the process of adaptation, one more aspect is to be mentioned: the preserving nature of the organizational culture. Being a kind of "a general agreement signed by the system's components that proves the status of dynamic inner organization equilibrium", preservation of interests of individuals (components) is inseparable part of any organizational culture. In this context, the organizational culture supports adaptation by achieving conformity between the individual and the collective interests (motives, behavior, etc.).

The last two discussed aspects of correspondence between the organizational culture and adaptation are of significant importance for the study. In fact, these aspects bring for "an inherited" contradiction in any organizational culture – the contradiction between, on the one hand, lack of tolerance to any deviation of the routine behavior, and on the other hand – the guaranteed level of individual component freedom. Taking into account that the organization contacts the environment through its components, balancing these two contradictory aspects of the organizational culture makes the component to perform their personal adaptation to the environment in conformity with the collective interests. To a high degree of certainty we can state that the organizational culture brings for the maintenance of a dynamic equilibrium between inner stability and the flexibility necessary to adapt to the dynamics of the environment.

Obviously, the organizational culture strongly influences the functioning of the organization and especially – the process of its adaptation. The consciousness of this fact makes the organizational culture subject to deliberate formation, maintenance and improvement.

Before answering the question what the particularity of the ship's crew culture is, let us summarize the results of studying the theoretical aspects of the organizational culture in the following conclusions:

The organizational culture in its peculiarity reflects the specific trends of the three structural aspects: the composition, the connectivity, and the relations.

[1] Smoothly changeable environment means that the dynamics of changes follows a cognizable rule (set of rules).

In spite of its spontaneous emergence and relatively high degree of subjectivism in the process of formation, the organizational culture yields to deliberate formation, maintenance and improvement. The idea in this process is to achieve better collective performance

Aiming to achieve internal stability, the organizational culture is directly related and consequently – dependant on the following organizational aspects:

- professionalism of the personnel;
- cohesiveness of the team;
- established relations among components and especially – subordination, and distribution of responsibilities;
- established routine strategies of organizational functioning.

One of the aspects of organizational synergism is based on the organizational culture: ability to achieve adaptation of the whole system to the dynamics of the environment as a result of component's processes of adaptation.

III. STUDYING THE PECULIARITIES OF SHIP CREWS

When speaking the ship crews, the first peculiarity emerges in the very beginning of the discussion – the maritime environment. Not intending to go deeper in this temping topic, let us say that this trend of the maritime profession is so important that it dominates almost any other characteristic.

Keeping in mind the paramount role of the maritime environment, let us focus our attention on the structural aspects: the composition, the connectivity, and the relations.

Starting with the crew's composition, the following conclusions are valid:

- the crew is composed by a great variety of members possessing high degree of narrow professional skils;
- the crew as an organization is limited in its ability to "replace" components due to the limited "reserve" of human resources;
- the abilities to substitute a crew member is restricted in number and in time;
- performance of a great variety of great variety of different ship typical functions insists on different structural realizations based on a constant composition.

In summary, the components (crew members) are to be highly prepared not only for their position, but also – for the positions that they are to perform as substitutes. Obviously, the well known idea for standardization of the maritime personnel education and training is absolutely valid in this case.

There is one more trend of the crew composition – the rotation of crew members. As it is mentioned above, the organizational culture needs time to be established. Obviously, we can't afford the luxury to loose time in assembling the crew after any replacement of a crew member. Two requirements are expedient:

1. The new member is to be highly professionally and psychologically prepared for his position.
2. The crew has to be made not to suffer the substitution.

The first requirement concerns the overall process of education and training including their regular maintenance when the person is not on board.

The second recommendation has an additional psychological aspect. A good idea is to establish a standard behavioral model for every position. Being to a high degree standard and unbiased, the education and training in virtual environment can contribute for the purpose.

The fact that nowadays most of the crews are international, additionally advocates for the idea of establishment of standard behavioral models. The real challenge is the question if it is possible the professional education and training to modify and superstruct the basic cultural trends (nationality, ethnicity, etc.).

The peculiarities of the organizational culture concerning the relations among a crew are multidirectional.

The most typical relations among the components are:

- highly developed hierarchy;
- clear distribution of the responsibilities;
- cohesiveness.

Although a variety of methodologies for education and training are focussed on the development of these qualities, one more challenge for the education and training in virtual environment is to be noted. It is the inherited contradiction between the degree of subordination and the cohesiveness. In fact, this contradiction is similar and closely related to the contradiction already mentioned – the lack of tolerance to any deviation of the routine behavior and the guaranteed level of individual component freedom. The differences are that in the case of subordination and cohesiveness, relations are formally established and are very often marked by strong personal nuances.

Let us conclude that there is one more argument for establishment of standard behavioral models.

The question of how the organizational culture reflects the connectivity is another multidimensional problematic field. One of its aspects is of particular interest. Being an organization that is to perform duties in potentially extreme conditions, in addition to the cohesiveness, friendship, accountability, etc., this type of functioning of the centralized structures strongly relies on the following ideas:

- maintenance of a firm chain of command;
- availability of duplicating connections for informational exchange;
- existence of bypassing connections for informational exchange.

In terms of the informational exchange, the real challenge in the case is the elaboration of a proper protocol for using the connections and adherence to the protocol[2].

Obviously, these problems can be solved by education and training, but it should be noted that they have already mentioned behavioural aspect.

In conclusion, let us summarize and say that there the peculiarities of ship crews formulate three specific areas in maritime education and training (E&T):

- Professional training.
- Team building.
- Establishment of behavioural models.

Before discussing the pros and cons of using modelling and simulations in these areas, let us provide our understanding about the question of how the organizational culture and maritime safety and security are interrelated.

IV. BRIDGING THE ORGANIZATIONAL CULTURE AND MARITIME SAFETY AND SECURITY

Taking into account that any study should not be a "closed" system and it is appropriate, on the one hand, to consider existing knowledge, and on the other – to lay a basis for future research in the area, it is a good idea to address two papers, published in the Proceeding of the 8th and the 9th Annual General Assembly of IAMU.

While discussing the methodological issues of preparing and conducting computer-assisted exercises on maritime safety and security matters and drawing a parallel between, on the one hand, the short-term, long-term and the evolutionary aspects of system adaptiveness, and on the other – the maritime safety and

[2] The problem in the case is that the bypassing connections establish shorter way for informational exchange. In spite of being useful in cases in emergency, the "time-saving" bypassing connections very often do not support the established chain of command.

security E&T[3], we use the brilliant metaphor provided by Professor Donna J. Nincic for explaining the difference between the safety and the security concepts: "*safety is doors open to allow free access for escape or rescue in a dangerous or unsafe situation. Security, on the other hand, is doors closed to prevent access to those who might wish to do us harm*" [2, p.147]. On this base, "*the security can be considered protection from active malicious agents*" and "*safety, on the other hand, can be considered protection from accident, maritime casualties...*" [2, p.147]. As it is formulated earlier in the paper, the organizational culture supports adaptation by achievement conformity between the individual and the collective interests (motives, behavior, etc.) and, in fact, the organizational culture brings for the maintenance of a dynamic equilibrium between inner stability and the flexibility necessary to adapt to the dynamics of the environment. Combining, on the one hand, the difference between safety and security concepts, and on the other – "the inherited" contradiction in any organizational culture (between lack of tolerance to any deviation of the routine behavior and the guaranteed level of individual component freedom), we can say that the safety supports the interests of the components, but the security supports the interests of the system as a whole. In fact, one of the aspects of the organizational culture is that, on the background of the safety end freedom of components, the security of the whole system emerges. In other words, the organizational culture "transforms" the individual safety of components into overall system security.

V. DEVELOPING ORGANIZATIONAL CULTURE IN MSS MATTERS THROUGH MODELING AND SIMULATIONS

Using the new technologies, modeling and simulations play a significant role in contemporary education. Because of its advantages, the education in virtual reality has to respond to bigger demands to simulating complexes, trainers and simulation models that have to be reproduced. Simulation is an instrument which helps us to understand the dynamics and the behaviour of systems. A simulation uses a model which is designed for this purpose. Some important characteristics of a model are purpose, relationship between model and original and reduction of complexity.

Models are substitutes of an original for defined, understanding and acting model-using subjects (intelligent systems) within defined time frames and by restrictions on given mental or real actions. The most determining principle of the purpose is that models are developed and applied in order to fulfil given goals or motivations.

Either a model is seen as a representation of its original, or is seen to be a prototype for a future construction. Thus there is a certain relationship between a model and its original in reality or between the future construction and its model in reality. The generation of models is a directed process in time and the model-original relationship can be subdivided into two aspects – representation of the original or prototype for a future construction

Using modeling and simulation in educational sphere has lots of advantages. They may be subdivided in two groups: advantages for the organization and educational advantages.

Advantages for the organization:

- better performance in live exercises and real incidents;
- train any time, anywhere without using operational resources;
- use existing training and exercise curricula, scenarios and play books;
- safe (no need for safety officers) and non-polluting;
- low training costs.

[3] For more information see: Mednikarov B, Dereliev P. and K. Kalinov. *Methodological issues of preparing and conducting computer-assisted exercises on maritime security matters.* Proceeding of the 9th Annual General Assembly of IAMU, San Francisco Maritime Academy, San Francisco, October 19 – 22 2008. ISBN 978-0-615-25465-4, pp. 289 – 302.

Educational advantages:

- powerful learning environment with the opportunity to experiment;
- creation of exactly the scenario circumstances needed;
- capture video clips and screen shots to use in courseware;
- training staff will have a full control over the exercise and after action review;
- observation and scoring should be structured and objective.

Integration of M&S in educational field allows going beyond the theoretical recognition of processes and phenomena and going ahead to obtaining of practical skills.

Despite the advantages, the use of simulators possesses some disadvantages.

The first is that simulation deals with manipulation of great number changeable characteristics of determined model of existing system. There are factors with uncertain relations with the whole system. This fact makes them impossible to include in the model.

The next can be determined as follows: It is difficult to create an intuition in educated and emotional sense that using simulations is aimed to determinate relations among different changeable model's characteristics.

Simulation research, [1] like any other research method, also suffers from problems and limitations. The value of simulation findings rests on the validity of the simulation model, which frequently must be constructed with little guidance from previous work and is prone to problems of misspecification. Simulation work can be technically demanding and susceptible to errors in computer programming. The data generated by simulations do not represent real observations, and the techniques for their analysis are limited. Also, it is risky to attempt to generalize simulation findings to areas of the parameter space not examined in the simulation.

In order to decrease the negative factors of simulators it is necessary to improve their performance to achieve realistic reproduction of simulation models and environment conditions.

A part of questions related to the use of modeling and simulation for increasing the level of organizational culture of ship crews are related to creation or building of behavioral simulating models that include personal characteristics and practical habits demanding adequate operational requirements by simulators.

The purpose of using modeling and simulation in this area is the creation of homogeneous environment of maritime personnel with logical and predictable level of competency able to integrate in crews with different stage of organizational culture.

From organizational culture definition follows that organizational culture has two main parts. The first is crew's adaptation to environment and the second is internal crews' integration.

When we talk about adaptation onboard we can subdivide it in three groups: professional adaptation, organizational adaptation and adaptation of crew members in extreme situation.

The methods available for improving adaptation include using agents, control theory, game-theoretic methods, or more ordinary model-related operations-research algorithms. The methods may be deterministic, stochastic, or a hybrid of the two. They have to be compared in order to be chosen the best method or combination of methods.

The adaptation relates on sub models that represent decision-making by officers; sub models that adjust simulated strategy and tactics in relation with objectives, situation, and projections; or sub models that represent, the behavior of individuals in different conditions.

The professional adaptation is related to building professional skills and work habits. It has close relation with degree of correlation between real and virtual environment and fullness of simulation model used in process of education and training. In this way, the more characteristics of environment are reproduced, the more knowledge and skills will be accumulated in the trainees.

In relation with the last we can think about integration of simulators and damage control exercise trainers.

If we create such a virtual ship it will be a prerequisite for the realization of the second component of organizational culture – integrity of the crew members for solving common tasks.

In relation with organizational culture aspect related to integration in organization additional explanations have to be made.

Applying system analysis to ship crews, we will notice that this is a complex system divided in different levels. As an example, we can distinguish officers and seamen, senior and junior, bridge team and engine room team etc. On war ship, things get even more complicated. The reason is the bigger number of crew members and appearance of new organizational groups. In this sense, we have to investigate internal integration not only in horizontal and vertical direction but also among the different levels.

Every one of the interacting subjects can form personal values, behavioral style and in this way it is possible to create a counterculture in contradiction with the existing and approved values and approaches.

In this case, a sub model can be created for every group or models representing two or more subjects.

The next aspect of the use of new technologies, modeling and simulations is related to multicultural environment. When we analyze organizational culture, we understand that one of the most important parts of organizational culture is the cultural features of crews' members. In today's merchant marine, most ships have international crews. This fact is a prerequisite for the formation of organizational culture with complex structure, internal system relations and processes.

The models representing this environment have to be flexible and they can provide descriptions of both physical and human phenomena, including situational awareness and environment conditions.

In this case M&S can be used for creating and testing organizational culture models. By way of changing the different model characteristics, we can make a conclusion about the behavior of the particular crew in different situations. This fact can be used in investigation of processes of crew's adaptation in critical situations.

Both internal integration and crew's adaptation can be improved by way of increasing the time spent in simulators.

Most questions related to increasing level of organizational culture can be solved by applying organizational measures. In order to mitigate one of the biggest disadvantages of simulators related to understanding that this is a game and whatever we do has no harmful consequences for us, personnel and ship are to set a requirement for obligatory examinations in simulators. In this case the goal of the trainees will be excellent performance to pass an examination and step ahead to successful realization in real world.

The next aspect of using state of the art technologies is related to the use of educating technologies in virtual environment.

The educating model in Bulgaria is a model based on class-lesson system. This model has lots of well known disadvantages. They are group education – it is impossible for a teacher to follow all his students, active teacher and passive students-it means that teachers teach, students listen, bad students-teacher correspondence, etc. In this model the goals of students are absent. [3, p.12].

Using present educational forms such as lectures does not correspond to our expectations. Educating technologies place the results in front of student instead of the teacher. In the base of such a model are international conventions and national educational requirements. This model puts the students in the active position. They have to do a determined job that will result in the formation of educational goals. It means that lessons, lectures and consultations will be a means of reaching results, not a goal.

The educating model allows education to be represented as sequence of procedures which will be planned for every person.

VI. CONCLUSION

Computer simulation [1] can be a powerful way to do science. Simulation makes it possible to study problems that are not easily addressed, or may be impossible to address, with other scientific approaches. Because organizations are complex systems and many of their characteristics and behaviors are often inaccessible to researchers, especially over time, simulation can be a particularly useful research tool for management theorists.

Simulation analysis offers a variety of benefits. It can be useful in developing theory and in guiding empirical work. It can provide insight into the operation of complex systems and can explore their behaviors. It can examine the consequences of theoretical arguments and assumptions, generate alternative explanations and hypotheses, and test the validity of explanations. By relying on formal modeling, simulation is in the base of scientific progress.

The new technologies allow simulators to be built in way that demand following of specific organizational culture.

Increasing the time spent by cadets in simulators will contribute to the formation of organizational culture adequate to the dynamics of life at sea.

References

[1] Harrison J., Lin Z., and G. Caroll. Simulation modeling in organizational and management research. Academy of management Review, Vol.32, 2007, № 4, pp. 1229 – 1245.

[2] Nincicl, D. "Maritime Security Education and Training: Establishing a Learning Community and Framework for Program Goals and Outcome". World Maritime Excellence. Odessa, 2007.

[3] Petrova, A., Strategic management. Piter. Sankt Peterburg, 2005.

[4] Schein, E. Organizational Culture and Leadership, 3rd Ed., Jossey-Bass ISBN 0-7879-7597-4.

MARITIME SECURITY EDUCATION AND TRAINING – EXPANDING THE ROLE OF IMO AND STCW

Fred Anstey,
Marine Institute of Memorial University of Newfoundland
E-mail: Fred.Anstey@mi.mun.ca

Abstract. The ISPS Code identifies obligatory training for both shipboard and shore based personnel, and IMO model outlines have been developed for each of the ship, company and port facility security officer courses. IMO has however abrogated its responsibilities as it pertains to maritime security certification and training by not articulating mandatory training requirements for either the port facility security officer or the company security officer. Non-mandatory guidelines, applied in an inconsistent manner will not suffice. The combining of the Ship, Company, and Port Facility Security Officer Courses into a new more inclusive Maritime Security Officer Course, with STCW certification, is the logical solution for security officer training. The systemic 'criminalization of the seafarer' has been, in part, caused by ship and port facility working in opposition instead of working together. A single MSO Course will result in more efficient scheduling and cost effective training for MET institutions and for industry. The current nonsensical structure requires that seafarers moving from SSO to CSO or to the PFSO position undergo subsequent and redundant training. If the IMO intends to impose mandatory regulatory requirements such as the ISPS Code on the global maritime industry, then it must follow through with requisite training and certification.

INTRODUCTION

The events of 9/11 have had a major global impact that has also been experienced by the international shipping industry. One of the earliest and most noticeable consequences is the advent, through the International Maritime Organization (IMO), of the International Ship and Port Facility Security (ISPS) Code. While this Code mandates new occupational security positions and requisite training within the maritime industry, the IMO has not used the STCW Code and Convention to full advantage to ensure uniform global compliance, particularly as it relates to training and certification for these identified positions. Additionally, IMO course outlines; STCW requirements for the Ship Security Officer (SSO); IMO training guidelines for the Company Security Officer (CSO) and Port Facility Security Officer (PFSO); and varying national oversight provisions have sent a mixed message to MET and to industry as to the appropriate level of training that is required.

INTERNATIONAL MARITIME ORGANIZATION

According to Özçayir [1], the origins of the IMO stem back to 1914 with the first iteration of a Safety of Life at Sea (SOLAS) Convention. The more formal establishment occurred in 1948, when an international convention founded the Inter-Governmental Maritime Consultative Organization- renamed in 1982 as the IMO. This 1948 convention drafted the original mandate and summarized it into an Article 1 of that convention. The five broad aims, including later amendments, collectively provide a mechanism for governments to work in a collaborative manner, particularly in the area of regulation and practices affecting shipping engaged in the international trade.

This mandate has been used to formulate a comprehensive body of legislation covering every aspect of shipping. The IMO [2] evidences this body of legislation through standards for ship design, construction, equipment, operation and manning, and key treaties include SOLAS, the MARPOL convention for the prevention of pollution by ships, and the STCW convention on training for seafarers– all examples that directly impact vessels. The mandate does refer to "...matters of all kinds affecting shipping engaged in international trade..." but as evidenced the IMO appears to concentrate legislation on those matters which directly and immediately affect vessels, and at least historically, has not used the mandate in a broader application to deal directly with shore based operations and entities.

International ship and port facility security code (ISPS)

The ISPS Code, formulated to enhance maritime security, is to form the basis for national security legislation for in excess of 160 signatory countries. Although IMO had previously dealt strictly and directly with ships, the objectives as espoused by ISPS make a stark departure from this model. The Code [IMO 3] mandates the establishment of a co-operative framework that is to include governments, agencies, administrations, and both shipping and port industries. These entities are tasked collectively to take appropriate measures in order to prevent security incidents from affecting ships or the shore based port facilities. Further, it states that responsibilities to ensure maritime security will be established at the national and international level. The functional requirements of the Code bind both ships and port facilities together when identifying procedural objectives governing communications, access controls, security plans, and measures for the prevention of the introduction of unauthorized weapons and devices.

The Code identifies the types of vessels to which ISPS applies and then defines port facilities as those entities servicing such vessels. The ISPS Code by application and through its very name treats both ships and port facilities as equal partners in this implementation of a holistic security regime. Further when assigning duties to the contracting governments it requires them to approve both port facility and ship security assessments and plans. Although ISPS does allow contracting governments to delegate certain duties to recognized security organizations (RSO), it does not allow them to delegate the approval of port facility assessments or plans, while it does allow ships assessments and plans to be approved by such organizations. Rather, it ensures that each country's marine administration is to maintain control over this matter, thus reinforcing the importance of these matters within the security regulations. The ISPS Code also directs contracting governments to provide to IMO information regarding each approved port facility, ensuring that these entities are included in the IMO database, and again is recognition that they are to form part of the overall security arrangement.

It is important to note that through the ISPS Code, it is the IMO that has created the vessel based Ship Security Officer (SSO) and the shore based Company Security Officer (CSO). Additionally it created and defined the port facility and thus the Port Facility Security Officer (PFSO). For both the ship and port facility the Code denotes responsibilities for persons with security responsibilities and has also identified required areas of training for each of these positions. Responsibilities for both ship and shore-based positions are similar in nature.

A comparison of the training requirements, for the CSO and PFSO, as identified in the ISPS Code, reveals very few differences. Part A of the Code states that each shall have received training as identified in Part B, which lists twenty areas of training. The areas listed are virtually identical for both the CSO and PFSO.

A comparison of the list of areas of training for the CSO and for the SSO also discloses pertinent information. The requirements listed for the SSO mirrors all of those listed for the CSO but it also enumerates five others. This is particularly enlightening as most training institutions, contracting governments and even the IMO model course outlines require more training for the CSO and of course the PFSO. This is particularly significant when designing course material, and even more so if combining all requirements into one common security course.

This brief review of the ISPS Code affirms that IMO has created the positions of CSO, SSO, and PFSO and that it places equal weight on the security procedures for both port facilities and for international shipping. Moreover it mandates training for all three positions and that such training is similar in content. It leaves little doubt that MET institutions are intended to be involved in the provision of such training but the format, and to some degree the content, are left in doubt especially with no formal recognition of this training, for two of the three positions, within the STCW.

IMO Model Course Outlines

The IMO has made significant use of model course outlines, developed with the help of IMO member governments and content experts. These outlines have been designed to ensure that prescribed training is consistent with the STCW Convention. Proper usage by MET institutions is expected to ensure global consistency but with the course outlines giving enough latitude for institutions to provide flexible application while at the same time curtailing the amount of effort normally required for course development.

According to IMO [4] each model course includes a course framework that details the scope, objective, entry standards, and other information about the course; a course outline with timetable; a detailed teaching syllabus including learning objectives; instructor guidance notes; and a summary of the student evaluation process.

Noting that the ISPS Code was constructed in quick fashion for an early implementation date, the IMO [5], with the help of governments of the United States of America and India, developed outlines for the SSO, CSO, and PFSO courses. Each was developed using the ISPS Code requirements as the basis for the model. A comparison of the model course outlines is particularly useful for determining the interrelationship of content requirements.

Model Course Outlines- CSO versus PFSO

When reviewing each of the three outlines it is apparent that many commonalities exist. A comparison of the CSO and PFSO outlines reveals striking similarities. Each suggests an eighteen hour course schedule, and identifies 11 major topics, with a total of 55 subtopics – all similar in description.

***Company* / Port Facility Security Officer – Course Timetable**

Day	1st Period (1.5 Hours)	2nd Period (1.5 Hours)	3rd Period (1.5 Hours)	4th Period (1.5 Hours)
Day 1	1. Introduction	2. Maritime Security Policy 3. Security Responsibilities	3. Security Responsibilities 4. *Ship* / Port Facility Security Assessment	4. *Ship* / Port Facility Security Assessment
Day 2	5. Security Equipment 6. *Ship* / Port Facility Security Plan	6. *Ship* / Port Facility Security Plan	6. *Ship* / Port Facility Security Plan 7. Threat Identification, Recognition & Response	7. Threat Identification, Recognition & Response
Day 3	8. *Ship* / Port Facility Security Actions 9. Emergency Preparedness, Drills & Exercises	9. Emergency Preparedness, Drills & Exercises	10. Security Administration 11. Security Training	11. Security Training

The model outlines also include the course timetables. The following table, as constructed, reflects the timetable for both the CSO and the PFSO collapsed into one with wording that is not reflected in the PFSO outline italicized. As can be seen the only differences within the table is the word 'ship' versus 'port facility'. The sub-topics, not shown in this table, reflect differences similar in nature. With these exceptions the timetable for the eighteen hour three-day CSO course is exactly the same as for the PFSO course.

A review of each of the two sets of learning objectives affirms that they are for the most part identical, except in a few minor areas, and where the topics may be particular to either the CSO or PFSO. Two examples of differing topics are 'documents required to be carried on board a vessel', and 'inspection of the ship security plan (SSP) by foreign port state control'. Other than these two examples the differences are largely in reference to the ship versus port facility and with the learning objectives virtually the same. As the major topics for each course are general in nature, for example the topic of 'threat identification, recognition and response', it may be questioned as to the value of offering two separate courses in response to the ISPS Code training demands. A common course with common topics but attacked from different perspectives by participants, according to the class composition, may be the answer.

Model Course Outlines- CSO versus SSO

A comparison of the model course outline for the CSO and SSO courses also identifies abundant similarities. The primary difference is in the course duration with 18 hours for the former and 12 hours for the latter. This would appear to indicate a marked difference in the two courses, but a closer examination shows that this is not the case. There are 55 and 52 sub-topics listed respectively for the CSO and SSO courses. All of the SSO subtopics are a subset of the CSO, leaving only the three additional topics for the CSO course. These three topics are 'development of the ship security plan', 'approval of the ship security plan', and 'instructional techniques'.

To some degree this conflicts with the ISPS training requirements, which identifies more topics for the SSO training than that for the CSO. In any case it is apparent that the two courses, according to the model course outlines are very similar and as will be noted the three additional topics are of value to the SSO.

Firstly, while the development of the SSP according to ISPS is within the purview of the CSO the Code also assigns responsibilities to the SSO which at least implies a required knowledge of SSP development. Section 12.2 of the ISPS Code directs the SSO, *inter alia,* to propose modifications, and to report deficiencies and non-conformities as identified through internal audits, and these duties all relate in some part to the development methodology of the SSP. In any case this sub-topic lists only three learning objectives. Secondly, the topic 'approval of the ship security plan' details the procedure for approval both for the initial plan and subsequent amendments. This information is also of value to the SSO. Thirdly, for the topic of instructional techniques, ISPS, when identifying duties for the CSO and the SSO, states that each are responsible for ensuring 'adequate training' for shipboard personnel. Further, the Sub-Committee of IMO [6] on Standards of Training and Watchkeeping, in its report to the 38th session of the Maritime Safety Committee (MSC), has endorsed proposed amendments to STCW with regard to security training for ship personnel. It recommends that security familiarization and security training be provided by the SSO or other qualified person. It is therefore apparent that these topics could and should be part of the training regime for the SSO as well as for the CSO.

There are also a number of topics where additional time above that allocated for the SSO course is allotted for the CSO course, namely 'ship security assessment', 'ship security plan', 'threat identification, recognition, and response', and 'emergency preparedness, drills, and exercises'.

The learning objectives identified in the CSO model course are the same as those for the SSO model course for the topic of 'ship security assessment', however there are an additional three sub-objectives. These relate to the description, method, and weaknesses of the security assessment. These additional sub-topics are allocated an additional hour of instruction. The ISPS Code, while making the CSO responsible for the security assessment, also suggests involvement by persons such as the SSO. It is also required that the assessment be appended to the SSP so that the SSO can understand the rationale for the included security procedures. This additional training material would be of obvious benefit to the SSO.

The second topic 'ship security plan' as discussed previously, allocates 2.5 hours instruction for the CSO training, and 1.0 hours for the SSO course. As the SSO has the primary responsibility for implementing and maintaining the SSP any additional training information would be of value. Furthermore it is the SSO who will have frontline contact with Port State Control Officers and should therefore have intimate knowledge of all aspects of plan development.

The third major topic 'threat identification, recognition, and response' allocates 1.5 hours and 2.5 hours respectively for SSO and CSO training. While the major topics are the same there are a few extra sub-topics for the CSO. However an analysis of these, to some degree, exposes a nonsensical approach to the training. This section should ideally be geared to frontline personnel including the SSO. The extra sub-topics for the CSO, for example, detail how to plan and carry out a search and how to manage a crowd. These topics would be fundamental for the SSO as it is that individual that is on the frontline and that will be required to implement these procedures and possibly to instruct other crew members in these matters.

The 'emergency preparedness, drills, and exercises' major topic outlines three similar learning objectives for SSO and CSO training with 1.0 hours and 2.0 hours allocated respectively. Again it can be argued that the additional content is also applicable to the SSO. This information pertains to the need for contingency plans; purpose of drills and exercises; the elements to be tested by each drill and the relevant elements to be assessed in a drill. As drills and exercises are carried out shipboard, this information is crucial to proper planning and execution.

IMO Guidelines for the CSO and PFSO

The roles of the CSO, SSO, and PFSO as newly formulated through the ISPS Code were not previously addressed through STCW. The MSC in 2003, understanding the need to develop new requirements, instructed the STW sub-committee to develop training and certification criteria for the position of CSO. In 2005 it instructed them to do similarly for the position of PFSO. However the STW sub-committee decided that the STCW was not the appropriate instrument to govern CSO training and certification as this position was shore based. The MSC, when asked for clarification on this matter, determined that guidelines instead of mandatory requirements were to be developed. It subsequently deemed similar guidance for the position of PFSO.

The IMO [7] accordingly promulgated the CSO guidelines through MSC/Circ. 1154 and the PFSO guidelines through MSC/Circ. 1188 [IMO 8]. Both sets of guidelines are similar in scope. They refer to an attached table of knowledge, understanding, and proficiencies (KUPs) and list only five major competencies. When using either the IMO model course outlines or the ISPS Code as a benchmark for training requirements it is evident that the level of knowledge required in these guidelines is deficient for both the CSO and PFSO.

The guidelines do not in fact require attendance in a training program. For both the CSO and PFSO positions they state that persons so designated should be able to demonstrate competence to undertake the identified tasks, duties, and responsibilities. It is further stated that these listed levels of knowledge should be sufficient. A rudimentary review of qualifications and experiences of persons attending maritime security training courses at one Canadian MET institution suggests that most persons identified as the CSO or PFSO have very little or no background involvement in security. The job requirements of the CSO or PFSO are commonly attached to persons filling managerial roles- quite frequently the HSEQ officer.

There are also concerns with the levels of oversight by different contracting governments when using this template as a measure of competence. Although the guidance states that the method for demonstrating competence is through the assessment of evidence obtained from approved training or examination, the guidelines allow for a wide range of such training, or in fact possibly no actual training but rather experience. It is interesting to note that both sets of guidelines state that persons that have completed an approved course based on the appropriate IMO model course outline should be considered to have met the training requirements for these positions. Why then not just use the model courses as the basis of this guidance and, because the positions are in fact mandated by the IMO through ISPS, go further and insist that this training be mandatory?

Standards of Training, Certification and Watch-keeping

The IMO through the MSC [9] has formulated, adopted, and promulgated changes to the STCW Code that affect SSO certification. The changes to Part B (guidance) are minimal but formally recognize the SSO and requisite training and certification. The title of Chapter VI now includes 'security', and a new section B-VI/5, entitled 'guidance regarding training and certification for ship security officers' is now added. However the information provided in this part, while recognizing the SSO does little more than state that training should be relevant to the ISPS Code. It does however recognize that the IMO model course may be of assistance in the preparation of such training.

The IMO amendments, through the MSC [10], to Part A of the STCW Code has modified the title to reflect the addition of security and to include a new section A-VI/5 that identifies the mandatory minimum requirements for the issuance of certificates of proficiency for the SSO. This new section also includes a KUPs table that is analogous to the one found in the guidelines for the CSO.

Similar to training provisions for the CSO, there are five competencies to be demonstrated in order to achieve proficiency as a SSO. However there are some additional stipulations in the CSO guidelines. While the SSO is required to achieve competencies in maintaining, and supervising the SSP the CSO is to additionally achieve competencies related to developing the SSP. Both the SSO and CSO are required to achieve competency in the area of assessing security risk, threats, and vulnerability – with nine associated KUPs- and with the only difference being that one of these KUPs for the CSO includes the procedures for conducting security assessments. The other KUP for the CSO pertains to instructional techniques. As discussed previously, there is anticipation that the SSO will be involved in security instruction for both crew with and without security duties and therefore it is advisable that the SSO have training on this topic.

The comparison of tables also discloses that the SSO is to achieve two additional KUPs- one related to the procedures for the ship security alert system (SSAS), and the second related to testing calibrating and maintaining security equipment. These areas are not unique to the SSO. The ISPS Code has determined that the CSO is a key player in procedures related to the SSAS. Activation of the system would normally denote that an event has occurred that impacts the security of the vessel and that the CSO is to provide communications and support in this eventuality. The CSO is instrumental in determining the type of security equipment to be installed on the vessel, and with providing training and spare parts required in relationship to this equipment.

The amendments to STCW mandate proficiencies for the SSO, however the training requirements, when left for the interpretation of contracting governments, are not succinct enough. The method for demonstrating competence is again through approved training or examination, and although it is stated that the IMO model course may be of assistance, there is no requirement for those governments to use this as the bench mark. Signatory states are not only able to impose different training criteria but often, at least for vessels flying their flag, view training approved by other states as deficient.

Further, in an attempt by IMO to distance itself from obligations as created through the ISPS Code it has created mandatory competencies and KUPs for the position of SSO while creating non-mandatory but comparable training for the CSO.

Contracting Government Implementation

The implementation of the STCW security requirements by contracting governments has varied. A review of Canada's interpretation and its instructions to Canadian MET institutions provides one such example. Transport Canada [11], in 2007, outlined course standards that institutions are to attain as part of the course approval process.

In general it is required that the course be in accordance with the Canadian Marine Transportation Security Regulations (MTSR) and the ISPS Code. It includes the STCW Table A-VI/5, as previously discussed and it states that the course must meet these requirements. It also references the SSO model course outline as beneficial and it recommends that course instructors complete the IMO train-the-trainer course, which is also based on the model course outline.

Transport Canada provides its own course outline that is to be followed for the design of the course and for submission for approval. Interestingly this outline does not follow the IMO model course for the SSO but rather the CSO course outline. The Transport Canada standards cover all of the major topics and sub-topics as listed in the CSO model course. Additionally it requires an 18 hour course, as does the CSO model course, versus the 12 hours required in the SSO model course. It does juggle some time requirements within four of the eleven sections but with the total hour number intact. This is just one example of interpretation of IMO certification requirements for the SSO and no doubt there are many other varying examples.

Combining the Courses

The quick development and implementation of the ISPS Code is at the root of many of the problems associated with the new world order of a systematic maritime security regime [Anstey 12]. The ISPS Code; the three separate IMO model course outlines; the IMO guidelines for the CSO and the PFSO; the STCW requirements for SSO; and the varying national interpretations of these requirements have all contribute to the confusion associated with maritime security training. This confusion extends not just to administrations but also to industry stakeholders and to training providers.

The introduction of the ISPS Code abruptly forced MET institutions into the field of security training-one with which many were not that comfortable. The uncertainty as to exactly what knowledge is to be imparted has also created confusion. However it must be reinforced that it is the ISPS Code that has created and defined the CSO, SSO and PFSO. It has also outlined training requirements for all three positions. The analysis of these requirements, as previously outlined, has shown the commonality that exists between each of the three positions. Many of the topics to be covered are found to be general in nature and are to be specifically applied by the student to the ship or port facility according to the nature and location of the operation as may be applicable. An examination of the topics covered for each of the three positions demonstrates the necessity for the entities to work together to create a strong security framework particularly during the ship-port security interface. Part B of the ISPS Code reinforces this by cautioning that even if the reader's interest relates to the ship or to the port facility alone that it is strongly recommended that they read the Code in its entirety to understand the relationship required with the other.

There is also the possibility that a person occupying one of these three positions may move into one of the others. In fact the guidance for CSO and PFSO training identifies precisely this eventuality. The guidance for PFSO training states that training objectives and KUPs are common for all three positions and instructs contracting governments to take this into account when setting criteria for any re-training or assessment. Similar advice is given in the guidelines for the CSO training.

A logical conclusion would be that one Maritime Security Officer Course (MSO) that subsumes the requirements of the current three positions may be the answer. Some, of course, may argue that port operations are drastically different than ship operations and such a course would not address this issue.

However the training as currently provided is not necessarily addressing this either. When following any of the guidance, courses are in reality raising security awareness. Lessons learned are then expected to be applied to the security officer's environment, whether it is at a port facility or on board the vessel. In fact that has to be the baseline. Even within for example port operations there are many variations, specialties, and locations which cannot be covered in a course where there are many persons from varying port facilities. The same problems would arise within a course for the SSO or CSO.

The MSO Course would have the further advantage of each person sharing experiences and concerns from their positional perspective. This would contribute to each having a better understanding of the others operational problems and solutions. By way of example, one current security topic is often the 'criminalization of the seafarer'. Does each entity always understand the problem of the other? Is the PFSO aware that crew members may be on board the vessel for lengthy contracts and only infrequently be able to avail of shore-leave? Do vessel personnel understand the port facility security requirements under the ISPS Code and national regulations?

A common course will also alleviate scheduling and cost concerns. MET institutions currently struggle with anticipating and providing the appropriate security courses as required by industry. Industry has the reciprocal problem of finding the appropriate course and at a time when crews or personnel are available to enroll in them. A common course will allow more offerings of the same course which allows more flexibility and greater likelihood of higher enrolment. As with any industry MET institutions are required to provide not only an effective product but also an efficient one. For example the provision of a training course for each of the PFSO, CSO and SSO positions and with only three students in each is obviously not as efficient as one common course with nine students. Cost is a concern not only for industry but also for MET organizations, which also operate with limited resources.

The IMO model course outlines should also be used as the basis for this combined course. The review of the three outlines has shown the commonalities that exist. They also mirror the training requirements as specified in the ISPS Code. Moreover, these course outlines are currently referenced in the CSO and PFSO guidelines; the STCW stipulations for the SSO, and even some national provisions as evidenced in the Canadian example. This at least demonstrates widespread awareness and usage of these documents. No doubt changes would be required to ensure they were to be reflective of the combined course.

A common MSO course will also produce uniformity in course length and with greater likelihood of mutual acceptance by signatory states. The IMO model course for the SSO identifies a two-day course while the PFSO and CSO courses are each designated as three-day courses. Lloyd's Register [13] currently offers a three-day combined SSO/CSO course, as approved by Denmark; a four-day CSO course, as approved by MCA; and a three-day PFSO course. Currently Transport Canada mandates a three day SSO course. There is little wonder that courses as offered and approved in one jurisdiction are not recognized by other jurisdictions! It is hoped that this further streamlining of course requirements would result in easier acceptance of training across administrations.

CONCLUSIONS

The IMO has a mandate, albeit generally untested, which allows it to deal with all matters related to shipping – even those not directly and specifically aimed at vessels. The organization has used this expanded interpretation of its mandate to formulate the ISPS Code and hence create the port facility and the shore based positions of PFSO and that of CSO. It is understood that the IMO, through the STCW, is required to set the standards for training and certification for the international shipping community. By failing to set mandatory standards for the IMO created positions of CSO and PFSO the organization has reneged on its responsibilities in this matter. By formulating only guidance for these two positions it has created confusion through the varying degrees of application by the international community. Any guarantee that training is uniformly provided and monitored, at a level that ensures the co-operative security framework, and as demanded by the ISPS Code, is questionable. There is no one answer for marine security training, but the combination of the security officer courses, using the model course outlines as the basis for such training, into a comprehensive MSO course would be a start. In time a revision of ISPS Code security training requirements and resultant IMO model course amendments may be necessary, but for now a mandatory MSO course would be of benefit to both industry and MET.

References

[1] Özçayir, Z. O., *Port State Control, second edition,* Informa Publishing Group Ltd: London, 2004, p. 37.

[2] IMO, *About IMO- Introduction to IMO.* IMO Newsroom. http://www.imo.org/About/mainframe.asp?topic_id=3.

[3] IMO, *International Ship and Port Facility Security Code,* 2003 edition, International Maritime Organization; UK, 2003, p. 6.

[4] IMO, *IMO Model Courses.* http://www.imo.org/humanelement/mainframe.asp?topic_id=292

[5] IMO, *Model Course- Company Security Officer (Draft),* International Maritime Organization: UK, 2003, Acknowledgements, p. i.

[6] Sub-Committee on Standards of Training and Watchkeeping, *Report to the Maritime Safety Committee- 38th Session.* IMO. 2007, p. 13. http://www.iamu-edu.org/pdf/(STW38-Report)17.pdf.

[7] Maritime Safety Committee, *Guidelines on Training and Certification for Company Security Officers,* IMO, 2005. http://www.marad.dot.gov/documents/MSC_Circ_1154.pdf.

[8] Maritime Safety Committee, *Guidelines on Training and certification for Port Facility Security Officers,* IMO, 2006. http://www.un.org/sc/ctc/pdf/1188.pdf.

[9] Maritime Safety Committee, *Amendments to Part B of the Seafarers Training, Certification and Watchkeeping (STCW) Code,* IMO, 2006. http://www.imo.org/includes/blastDataOnly.asp/data_id%3D14730/9.pdf.

[10] Maritime Safety Committee, *Resolution MSC.209 (81)- Adoption of Amendments to the Seafarers' Training, Certification, and Watchkeeping Code (STCW Code), IMO. 2006.* http://www.mpa.gov.sg/sites/circulars_and_notices/pdfs/shipping_circulars/sc07-12f.pdf

[11] Transport Canada, *Recognition Program for Approved Ship Security Officer Training- Submission Requirements and Course Standards.* Minister of Transport Canada, 2007.

[12] Anstey, F. A., *The Fast-track to ISPS Code and National Security Regulation Implementation and the Implications for Marine Educators.* IAMU Journal Volume 4, No. 2. 2006.

[13] Lloyd's Register, *List of Public Training Events for 2009,* Lloyd's Register; UK, 2009. http://www.lloydsregister.dk/Files/Schedule2009.pdf.

ON THE PROJECT TO DEVELOP IT-BASED ADVANCED SHIP OPERATION TECHNOLOGIES AND THEIR APPLICATION TO MARITIME EDUCATION

Hideo Yabuki,
Yoko Uchida,
Tadatsugi Okazaki,
Ruri Shoji,
Tokyo University of Marine Science and Technology
E-mail: yabuki@kaiyodai.ac.jp

Abstract. Following a rapid introduction of Information Technology (IT) into navigational equipment and ship operation supporting systems, development of a new educational method to teach IT-based advance ship operation technology is strongly desired. This paper describes the outline of the TUMSAT project which aims at developing both advanced IT-based ship operation technologies and a curriculum to provide students with sufficient knowledge on these technologies.

1. INTRODUCTION

Information Technology (IT) has found its way into shipping to achieve safe and efficient marine transportation as is exemplified by the IMO e-Navigation Strategy. In order to lead the way in this new field, the Tokyo University of Marine Science and Technology (TUMSAT) launched a new research and development project in 2008 on IT-based advanced ship operation and control technologies, i.e., Maritime Broadband Communication System and Advanced Ship Operation and Control System. The TUMSAT also intends to integrate the outcome of this project into its curriculum to provide young professionals, who will be working for the maritime industry, MET institutions, and the maritime authorities, with sufficient knowledge in advanced marine-related IT technologies.

It is a 3-year project between 2008 and 2010, and is run by four groups: the Maritime Broadband Communication System Group, the Electronic Navigation System Group, the Advanced Ship Operation and Control System Group, and the Advanced Management System for Marine Engineering Group.

The first group attempts to develop a communication system which enables ships at sea and land-based personnel to share ship operation information. The second group aims at developing a navigation assistance system following the e-Navigation Strategy proposed by the IMO. The third group focuses on ship control technologies such as tracking control, ship to ship operation, and automatic berthing. The last group endeavors to develop a knowledge bank system for marine engineering operation.

In this paper, the authors introduce the outline of two research outcomes obtained in 2008. One is the development of Maritime Broadband Communication System that is installed onboard the university training ship Shioji Maru [1]. The other is a practical education method to teach undergraduate students on tracking control engineering using the autopilot of Shioji Maru [2].

2. DEVELOPMENT OF THE MARITIME BROADBAND COMMUNICATION SYSTEM

2.1. Outline of the system

The purpose of the maritime broadband communication system is to realize a new seamless communication service between ships and shore users which is derived by a high speed and a high capacity communication network system. This system, called the Marine Broad Band Network (MBB), has been developed by the Maritime Broadband Communication System Group with the support of 7 manufacturers and companies in Japan.

The MBB utilizes the JSAT Inc.'s satellite and the network service of NTT Communications, Inc. The communication speed of the system is confirmed to be 1 Mbps in up link and 1.2 Mbps in down link between the Satellite and the training ship Shioji Maru by full-scale experiments. In order to realize the broadband communication between ships and shore users, we need a real time data observation system and data transmission technique utilizing the onboard Local Area Network (LAN), and we also have to establish a unified standard of signal communication. Since the establishment and standardization of the onboard LAN system are essential, our project has been technically supported by the Japan Marine Equipment Association.

The MBB system makes it possible to provide seafarers with the same Internet environment as the one on the shore, and useful information for safe navigation, such as weather and wave prediction data, is made available to the Master.

2.2. Applications of MBB communication to the marine transportation

Examples of the application of MBB communication for the safe and efficient marine transportation are shown in Table 1.

Table 1

Examples of the application of MBB network

Field	Item	Form	Contents
Welfares	Welfares for crew	Image,Data	TV phone, Internet, Mail, TV, etc.
Medical	Remote medical service	Image,Data	Diagnosis to patient
Safe Navigation	Outside and inside watch	Image,Voice	Lookout by camera, etc.
Monitoring	Hull monitoring Engine monitoring Cargo monitoring	Data	Monitoring of hull stress, navigation information, ship's motion, engine operating data, etc.
Information Support to Ship	Environmental information	Data	Weather & wave forecasting, Weather routing, Route information, etc.
Guidance	Way point, Tracking and control	Data	Guidance and control of ships in ocean and port
Ship Management	Damage control Ship performance	Data,Image	Damage control, Long term performance management, etc
Risk Management	Hazard at sea	Data,Image	Real time information exchange

2.2.1. Image Data Communication

The most powerful effect that will be obtained by the realization of MBB is the exchange of image data. The shore users and the onboard users can receive or send real and clear image data at the time of their demand.

For example, the image data exchange between ships and shore users is very useful in the case of damage diagnosis of main engine and other machineries. Fig. 1 shows the engine monitoring by the engineer with a head mounted camera in the engine room. The real time image data can be sent easily to shore users through the MBB, and not only onboard seafarers but also the technical staff on the shore can monitor the state of the engine and understand details of the damage clearly. This technique can also be applied to remote medical service for a patient onboard, who can be diagnosed remotely by a doctor on the shore.

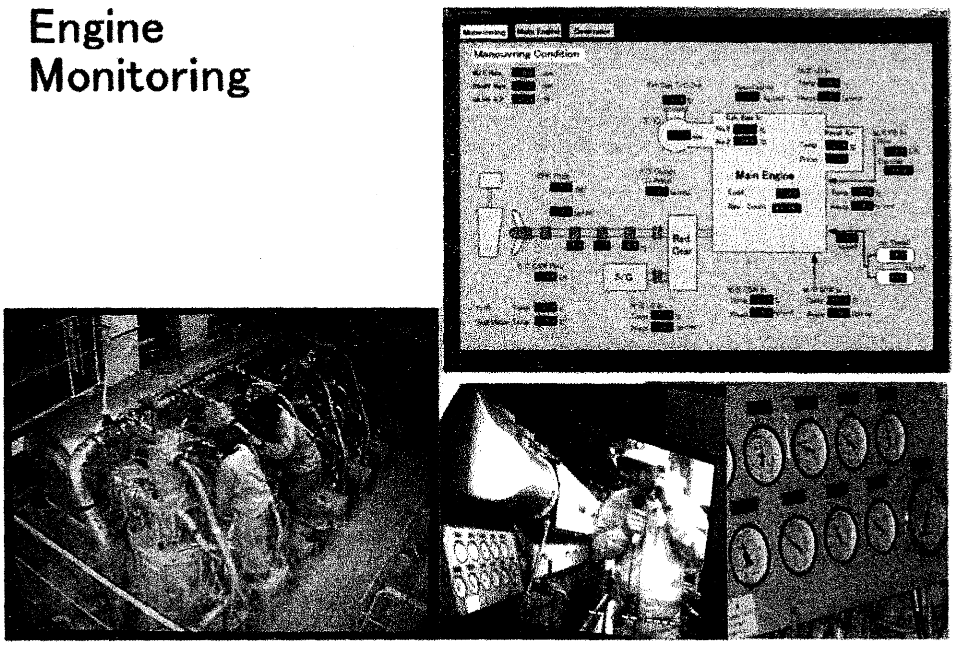


Fig. 1. Engine monitoring with a head-mounted camera

2.2.2. Ship Monitoring System

Nowadays, energy saving in ship operation to promote an eco-society has become the highest priority in the marine transportation. In the ship operation, most of the energy loss is caused by the increase of hull resistance and frequent irregular change of engine revolution due to ship oscillation in a rough sea. Therefore, continuous monitoring and analysis of the ship operation data such as speed, hull motion, wind, wave, the state of engine operation, etc., are important for the energy saving navigation. Fig. 2 shows an example of the display of these ship operation data. However, this kind of work has recently become difficult for the crew due to their reduction in number and the drop in skill. Because of this, the technical staff on the shore can monitor the real time ship operation data instead, and give proper advice to the onboard seafarers for safe and effective operation by analyzing the received data. The displayed time history of hull motion and the data analyzed are shown in Fig. 3.

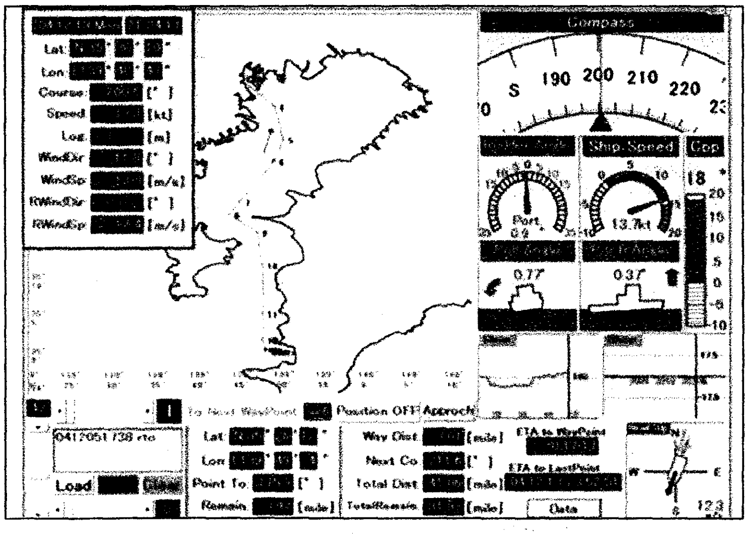


Fig. 2. Example of the display of ship operation data

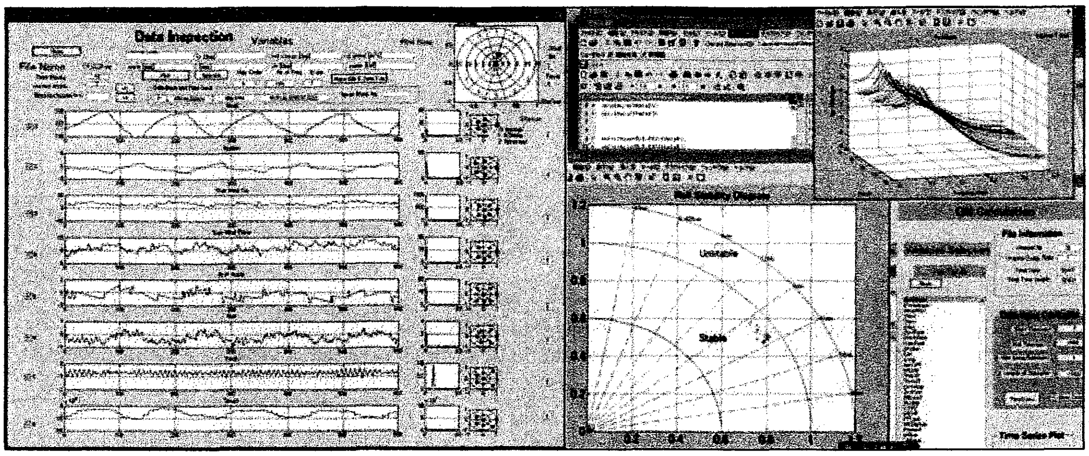


Fig. 3. Displayed time history of hull motion and analyzed data

2.2.3. Long Term Engine Operation Management

Real-time engine operation data is transmitted to the shore server through the MBB and is distributed to each ship, which is stored as a database. For instance, the technical staff can estimate the proper sea margin of each ship by analyzing the long term operation data and informing it to the onboard engineers. Fig. 4 shows the example of the sea margin analysis. The above-mentioned engine operation database can be used for the prediction of seasonal effect and aging effect on the fuel-saving operation, as well as the proper time of hull cleaning in the dockyard.

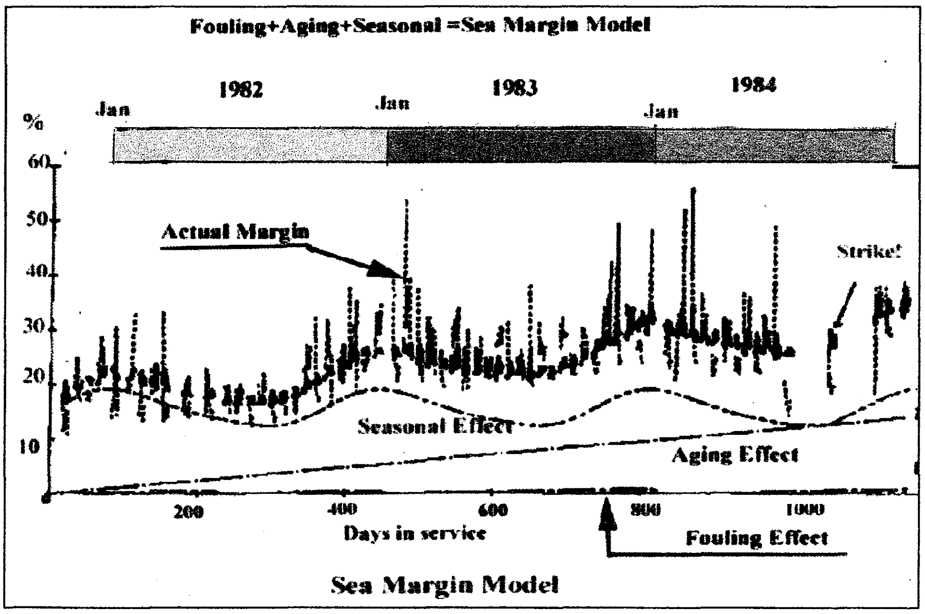


Fig. 4. Example of the sea margin analysis

2.2.4. Ship's Weather Routing

Although domestic ships can provide economical and ecological transportation compared to the vehicles, their operation schedule depends on the marine environment such as wind, wave and current. A voyage plan to minimize the fuel consumption is made prior to the departure, taking into account the change of weather and the effect of current along the route. However, since the forecasted weather condition often changes during sailing, there is a ship's demand to get the latest optimal route information for re-routing calculated based on the present ship operation data via MBB and the updated precise weather forecasting data. Fig. 5 shows the image of this optimal weather routing navigation.

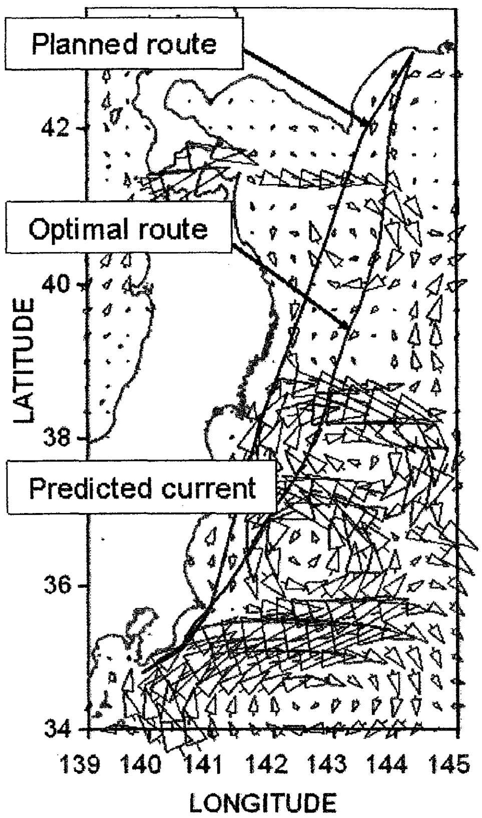


Fig. 5. Image of the optimal weather routing navigation

The Maritime Broadband Communication System Group has already carried out the actual ship operation experiment using a domestic merchant ship [3] and confirmed that the proposed method is feasible and effective for the fuel-saving operation.

3. DEVELOPMENT OF THE PRACTICAL METHOD OF TEACHING MARINE CONTROL ENGINEERING USING A TRAINING SHIP

In this section, the authors introduce a method to teach the conventional control theory to the third year faculty students using the training ship Shioji Maru.

A lecture on the general control theory is first given and how to design autopilot systems is taught making use of the MATLAB and SIMULINK as program languages. Autopilot system is just one of several conventional automatic control systems, but it makes a good introduction for students to understand the PID control theory.

Designing of a control law for actual system is carried out in the following well-known procedures: (1) Identification, (2) Designing, (3) Simulation, (4) Actual Test, (5) Evaluation and Modifying.

The developed teaching method for the students is designed following the above procedures and it uses an actual training ship instead of a small model craft in the laboratory. Fig. 6 shows the procedure of the proposed teaching method.

1. Learning of a concept of feedback control theory using a ship

⇩

2. Learning of the Laplace transformation as an analytical tool of ship's motions

⇩

3. Learning of MATLAB, SIMULINK programs

⇩

4.Maneuvering test for identification of Maneuverability Indexes T and K

⇩

5. Design and actual tests of autopilot

⇩

6. Onboard exercise

Fig. 6. Procedure of the teaching method on marine control engineering

3.1. Classroom lecture on the feedback control theory and onboard experiments

The ship's autopilot system provides useful information on the concept of feedback control theory, and that is why we have our students design the ship's autopilot in order to teach them the above classical control theory.

As the first step, the teacher has the students understand that the feedback system dealt with in this lecture using an actual ship is one of the important techniques to solve not only the ship's course keeping problem but also more general similar ship control problems.

Fig. 7 shows a comparison of the block diagram between the ship's autopilot system and the first order system treated in the control theory.

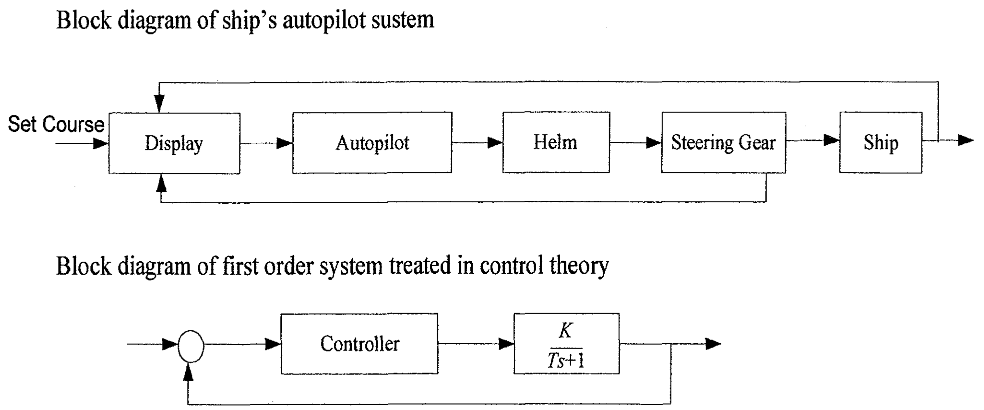


Fig. 7. Block diagram of the autopilot and the first order system

In terms of the ship oscillation theory, the ship's motions are generally classified into two typical systems. One is the first order system which does not oscillate. This system corresponds to ship's yawing motion which is exerted by a rudder. The other is the second order oscillating system which corresponds to a rolling motion in waves.

In particular, the ship's autopilot system that aims to keep the ship's course to the desired direction is a typical control system on the first order system. Therefore, by learning the autopilot system, the students can master other designing techniques that also make use of different first order large systems.

The Laplace transform technique is an important tool for system analysis and designing of effective control system. The teacher should teach the theory by use of actual system, not the concept of the system. In this lecture, we select a ship's course keeping problem as a first order system and a ship's rolling motion as a second order system.

The famous model for representing a ship's yawing motion by steering is Prof. Nomoto's KT model [4] and it can be described as following equation.

$$T\dot{r} + r = K\delta \tag{1}$$

where r is a turn rate of ship's yaw and δ is a rudder angle, T is the index representing a ship's transient characteristic, and K is the index representing a ship's turning characteristic.

The transfer function of this model is

$$G(s) = K/(Ts+1) \tag{2}$$

The feature of this lecture is that the students study the standard classical control theory using the MATLAB and SIMULINK programs and the actual training ship.

MATLAB and SIMULINK are the most powerful programming languages for designing a control system, and TUMSAT utilize these program languages as a fundamental education tool for students. Moreover, we can build up an actual executable real time control target program using the MATLAB, xPC target system. The xPC target system consists of the server PC, in which Analog/Digital, Digital/Analog and Serial COM interface are installed, and the client PC which has MATLAB and SIMULINK installed. The students make a program as shown in Fig. 8 using the SIMULINK.

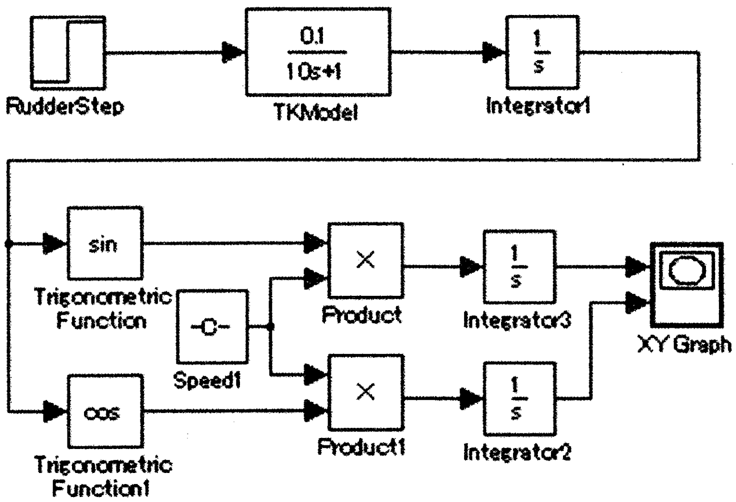


Fig. 8. SIMULINK program for the ship's yaw motion model

In general control theory, the designer must input a special signal such as the step input and the impulse input to the target system for identification of the system. In the field of naval architecture, the designer executes an actual sea trial called the Zigzag test (Z-test) for identifying the parameters T and K.

In the proposed teaching method, the students conduct Z-test by themselves onboard training ship SHIOJI MARU and identify the parameter T and K. It can also be executed automatically by the xPC target system.

3.2. Design of autopilot and its evaluation

The next step is to design an autopilot for Shioji Maru which has both course keeping function and course tracking function. Fig. 9 shows a diagram of the PID autopilot system designed by our students.

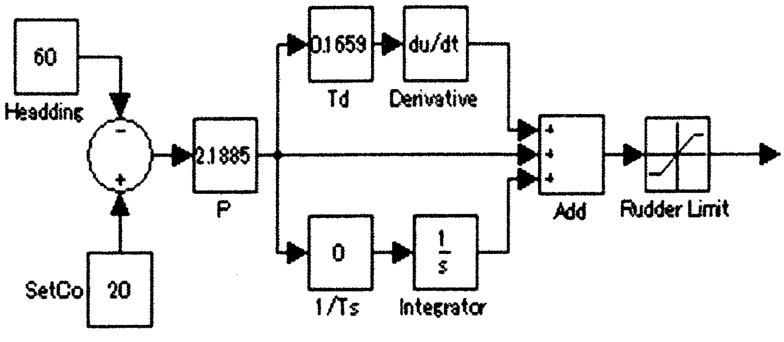


Fig. 9. PID autopilot designed by a student

Usually, the tuning of PID gains is made using the rule of thumb method after the sea trial. However, the SIMULINK system has a support system to preliminarily check the tuning results of PID gains prior to the sea trial. Therefore we teach the Ziegler-Nichols method, the limiting sensibility method and the root locus design method using the SIMULINK at the preparatory lecture.

After completing the preparatory exercises, the students take the challenge to carry out actual onboard tests with PID gains set by them selves. Fig. 10 shows the result of the actual course keeping test using Shioji Maru.

The last step of the exercise is the design of the course tracking function and their evaluation. In the exercise, 15 students are divided into 3 small groups and the work described below is assigned to each group. This exercise is a competition, and is conducted onboard Shioji Maru using the experiment facility shown in Fig. 11.

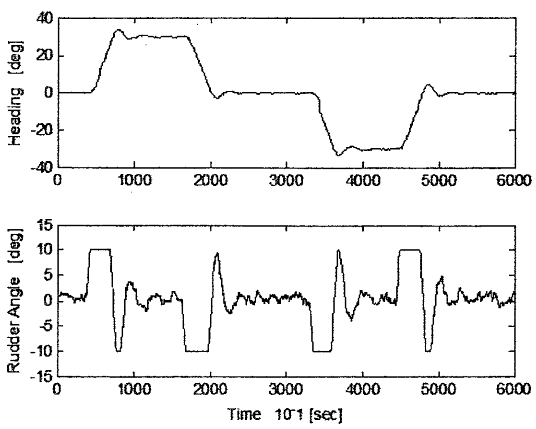


Fig. 10. Result of the actual course keeping test using Sioji Maru

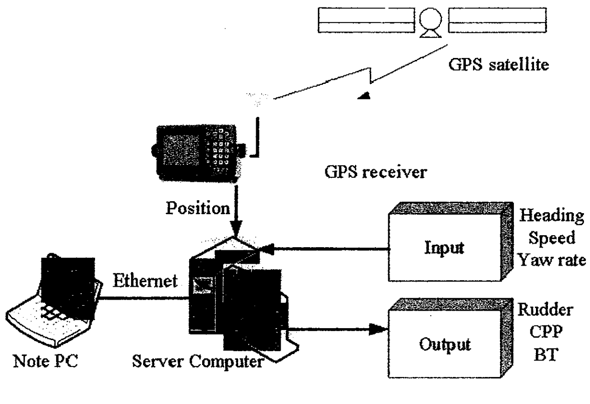


Fig. 11. Experiment facility in Shioji Maru

Assignment Directions: Design an automatic tracking system to track along the given line, using the autopilot designed in the last exercise. The ship's positions can be observed by DGPS (Differential Global Positioning System).

Fig. 12 shows the result of the best performer in the exercise. It is possible for the instructor to evaluate the fundamental knowledge of the students on the autopilot easily through this onboard exercise.

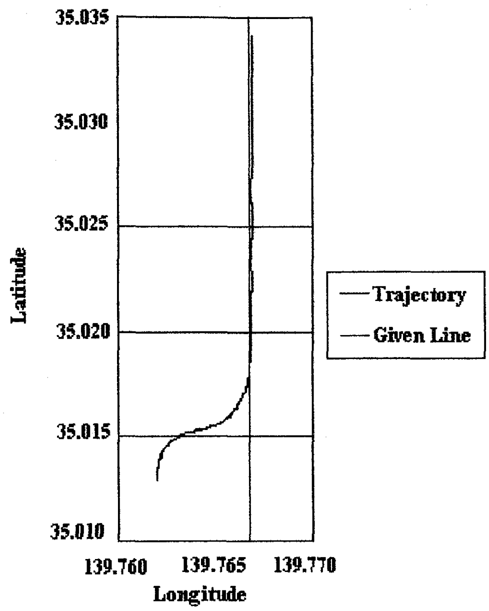


Fig. 12. Result of the top performance of the exercise

4. SUMMARY

In this paper, the authors introduced two outcomes of the IT-based advance ship support system research project in the TUMSAT.

On the Maritime Broadband Communication System, we described the necessity of a high speed, high capacity communication system between ships and the shore, and introduced some of the applications which utilize the MBB network for ship operation support from the shore. We believe that the Maritime Broadband Communication System such as MBB is effective to realize a safe and energy-saving eco-navigation system.

We developed two educational programs on the ship control. One program is to learn the PID control theory using the autopilot and the other is for the learning of the linear oscillation theory. Usually, the automatic ship control technique and the basic linear oscillation theory are taught using a small model in the laboratory. The proposed teaching method utilizes the actual training ship and the students can experience the way the above theory is applied to actual ship-handling. This will be a good help for students to understand these complicated control theories. As our next step, we are planning to develop a program for students to learn about the remote communication theory utilizing the satellite-based ship to shore network system installed in Shioji Maru.

References

[1]. Shoji R. et al., "Development of Maritime Broadband Communication", Proceeding of the 1st workshop on Development of Advanced Ship Support System using Information Technology, TUMSAT, February 2009.

[2]. Okazaki T. et al., "Practical Education for Marine Control Engineering Using an Actual Training Ship", Proceeding of the 1st workshop on Development of Advanced Ship Support System using Information Technology, TUMSAT, February 2009.

[3]. Takashima K. et al., "Energy Saving Navigation for Coastal Ships Based on Precise Environmental Forecast", Proceeding of Asia Navigation Conference 2007.

[4]. Nomoto K. et al., "On the steering of ships," ISP, vol. 4, 1957.

THE TRAİNİNG OF EDUCATOR ON "MEASUREMENT AND ASSESSMENT" WİTHİN THE SCOPE OF STCW

Banu Tansel Özen,
MSc
Melek Ertogan,
MSc
Maritime Faculty, Istanbul Technical University, Turkey
E-mail: ozen@itu.edu.tr, ertogan@itu.edu.tr

Abstract. Being an unseperable part of educational process, measurement and assessment is useful for determining whether the education goals are met. Basically, assessment aims at enhancing educative processes and improving student quality. A liable, appropriate, supportive kind of measurement and assessment is not only substantial for learning, but also important for progress of performance, efficiency of the process, and statistical analysis as well. Some professions, which are acquired through certain trainings, have to go through some measurement and assessment processes, for the responsibility they hold within their constitution. Namely, Maritime Education is one of them. What are the necessary criteria and methodology for carrying out a 'measurement and assessment' analysis in a top-level maritime education institution? Hence, are these familiar to the educators? Considering a measurement tool, practicability is an equally important quality as reliability and validity. A measurement tool or method being practical means that it has characteristics like ease of, objective and economic in improvability, reproducability, applicability and scoring. While carrying out the evaluation, the content of the assessment (what to measure?), the method for data acquisition (who should use which assessment tools?), technical requierements of assessment (is the assessment valid and reliable?) and where and how the assessment results are assessed should be worked out.International Maritime Organization's (IMO) STCW convention compels that adequacy of education must be assessed and continuously monitored. In 1995, the convention was revised so as to make clear the efficiency of standards, to determine efficiency needs of instructors and evaluators and to perform effective practice. The whole point in doing so is to determine a common level, while putting the stress on education.

Educators should go under a training program of which standards were set in accordance with the criteria and methodologies of the subjected institution's policy. The aim of this article is first to designate a model of "measurement and assessment training" for a maritime education faculty staff, within the scope stated above, and then to determine its efficacy. Accidents, which took place in the engine room, caused by lack of education, were assigned as the random sample within a certain period of time, and educators were trained in a way that they could assess the issue through Cluster Statistics Analysis. The reason for assigning accidents that were caused by lack of education as the random sample and collecting and assessing related records is to let the instructor base his/her criteria and measures, with which he/she evaluates the students on concrete data. By using this measurement and assessment method, the educator builds up a Stratified Calculation Schedule so as to let the educator define both the levels of efficiency which the student is supposed to acquire and and to let him gradate the measures in between. Through designing an examplar education model, the gain is to set a healthy ground where a self-evaluation method for evaluating the institutions and educators will be build up on.

1. INTRODUCTION

The concept of human factor in the seas includes the crew members serving on the ship and everything that plays a role in the interactions between any person, system or machine on the ship. According to official statistics from US Coast Guard, approximately 80 % of accidents and incidents in marine environments are due to human error or human factors [3]. If human factors in the accidents could be minimized, the number of total accidents happening could be reduced by a half. In order to achieve this improvement, it is essential to move down to the basics and conduct a study within the scope of educational institutions training seamen. This study's priority should be to comprehend the problem and discerning its dimensions; such as by determining the proportion of accidents due to human factor and examining their damages. The stage following this important determination should be statistical assessment the parameters that are required to avert accidents and then devising a model that will ensure improvement that is also usable by the educators.

When dealing with human factor, which is the primary element in occurrence of marine accidents; it has been identified that causations like carelessness, inadequacy, lack of training, fatigue, lack of dialogue and inadequate coordination are effective. Without a doubt, it is impossible to fully eliminate the accidents caused by human factors, yet a certain amount of reduction in frequency of such accidents can be attained by avoiding those that could be prevented by additional training. The purpose of this article achieving training based improvement by devising a model and assuring its application.

In a report released by Japan's "Marine Accidents Inquiry Agency" in 2004, marine accidents that took place during 2003 have been analyzed. According to this report, among the 715 accidents that happened, 300 of them were caused by (42 %) collusion. When the collusion caused accidents were examined, it was found that 54 % of them were related to "Inadequate watching". Second leading cause was the violation of traffic rules. Other causes could be listed as failure to give sound signals, mismanagement such as giving erroneous orders, inappropriate speed, dozing off, passing ships and not reporting, and failure to display the necessary lights and signs. In the same report, 176 accidents in categorized as grounding that comprised 21 % of total accidents were investigated and an interesting situation was spotted. The foremost reason behind grounding was detected to be dozing off, with a proportion 31 %. When the other accident causes were inspected, it was seen that all of them were caused by human factors. In the same report, it is stated that only 11 % of total accidents happened as a result of mechanical breakdowns [2].

The emerging conclusion is interesting due to determination that almost all marine accidents are caused by human factor; because among the machinery failure linked accidents, the underlying factors behind machinery failures are mostly comprised of deficiencies in machine maintenance attitude and mechanical circuit management. The ratio of accidents arising from mechanical structure related technical errors among general mechanical breakdowns is only 18 % [2], [4].

2. A GENERAL INVESTIGATION INTO MARINE ACCIDENTS DUE TO HUMAN FACTOR

The main factors of accidents are unsafe acts and unsafe conditions. Unsafe Acts encompass human performance factors including operational error on the part of any crew member of a vessel, a pilot or shore personnel. Unsafe Conditions consist of any identified condition contributing to an occurrence such as: Environmental conditions, vessel condition and other conditions.

Causes of accidents in the Baltic Sea during 2006; The main cause of accidents in 2006 is not as clear as the year before due to the lack of information for 35 % of cases. However, human factor seems to continue to be the main reason for an accident to happen (36 %), followed by technical factor (15 %) (Fig. 1) [1].

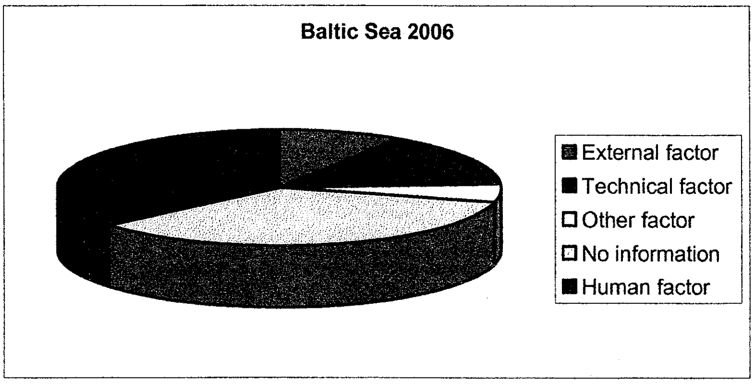


Fig. 1. Causes of accidents in the Baltic Sea during 2006, Total number of ships in accidents: 117 [1]

Human factor was also dominating in accidents with pollution, causing four out of five accident cases (Fig. 2) [1].

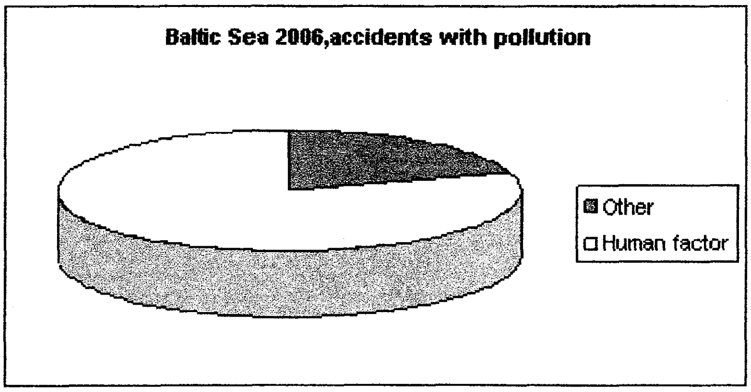


Fig. 2. Causes of accidents resulting in pollution in the Baltic Sea during 2006,
Total number of accidents with pollution: 5 [1]

3. MEASUREMENT AND ASSESSMENT EDUCATION MODEL

Institutions giving Maritime Education are increasingly more required than ever to raise graduates that can renovate themselves for adapting to today's conditions, apply what they learned, develop new designs, conduct teamwork and posses communication skills. Mariners that possess these attributes will provide a significant reduction in accidents happening due to human errors. In this context, maritime accidents with human factors have been analyzed by sets statistical method in Istanbul Technical University Maritime Faculty (ITUDF) and "measurement and assessment parameters" were put together. The devised parameters have been utilized for a full academic term by the instruction personnel teaching "Electronics Laboratory" and "Automatic Control" classes in training and evaluation of the students. The data used in the statistical study that was needed for determining and classifying the parameters related to the "Measurement and Assessment Education model" has been collected from the publicly available Internal Maritime Casualties and Incidents reports, which are found in the website of Internal Maritime Organization Global Integrated Shipping Information System. The selected accidents were determined to be the 30 ship accidents taking place between Oct. 10, 2004 – May 16, 2007 and which were attributed to human error, provided that this specific cause being recorded in the accident reports.

We used to cluster statistics method for data analysis that is a multivariate analysis technique that seeks to organize information about variables so that relatively homogenenous groups, or "clusters," can be formed. Cluster analysis is relatively simple, and can use a variety of input data that is a relatively new technique. We used to four basic cluster analysis steps: data collection and selection of the variables for analysis, generation of a similarity matrix, decision about number of clusters and interpretation and validation of cluster solution. The main outcome of a cluster analysis is a dendrogram. It is shown basic steps our study which is also called a hierarchy of model diagram by us (Fig. 3) [5].

Of the investigated accidents, 21 of them were graded as very serious and the remaining 9 as serious or less serious and the classification of the accidents were determined as collision, grounding, capsizing and stopped engine. These accidents have resulted in consequences like loss of life, material damage and environmental pollution. The human errors in the accidents have been classified as inadequacies or deficiencies of the following issues; maintenance, operation, communication, observation and fault diagnosis, keeping pace with technology development, ability to conduct multiple tasks simultaneously, decision to a pressured or emergency situation, adaptation on new situation, keeping the rules, personnel diagnosis, keeping pace with technology development, ability to conduct multiple tasks simultaneously, decision to a pressured or emergency situation, adaptation on new situation, keeping the rules, personnel

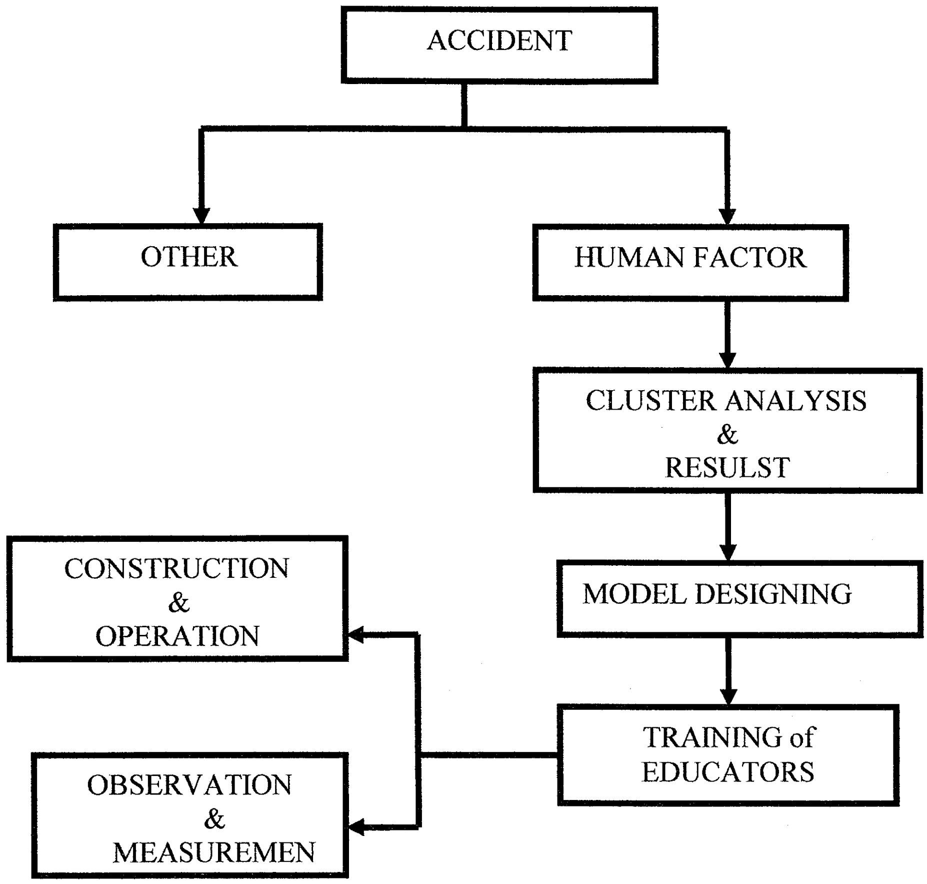


Fig. 3. Hierarchy of model diagram

responsibility, and knowledge and practicability. This classification and the seriousness grades of the accidents they resulted in have constituted the matrix base of our model. After completing the classifications and devising the coefficients that indicate the severity levels of these classifications, the application model's parameters were determined by selecting the factors that could be corrected by training (Fig. 4).

As a result of our study, it has been seen that, as much the information level given in marine education and the implementation skills, it is important that a seaman can achieve teamwork at almost the same proportion, perform a duty without delays within a hierarchical structure by using either verbal or written data transmission tools as needed, besides by virtue of leadership attributes give the most right decision, which means possessing logical thinking skills, and show controlling skills on multi-tasks.

Percentage distribution of human related errors according to ship accidents and according to severity of their damaging consequences is presented in Fig. 5 (having horizantal axis correspondes to human error types) and Fig. 6, respectively. As a result of this statistical study, it has been revealed that inadequacies associated with the adopted theory and limited practice facilities exist in classical education. It has been deduced that it is quite important for the instructor, other than individual measurement and assessment of the student, to evaluate the student with respect to interstudent communication, coordination, attitudes in leadership role, decision making under pressure and emergencies, and process of adaptation to new conditions.

Human Error Types	Evaluation State
1. Knowledge and practicability	1. Low
2. Personal responsibility	2. No
3. Keeping the rules	3. No
4. Adaptation on new situation	4. Not enough
5. Decision to a pressured or emergency situation	5. False
6. Ability to conduct multiple tasks simultaneously	6. Not enough
7. Keeping pace with technology development	7. Not enough
8. Observation and fault diagnosis	8. Not enough
9. Communication	9. No coordination
10. Operation	10. No team working
11. Maintanence	11. Substandard

Fig. 4. Evaluation and grading parameters

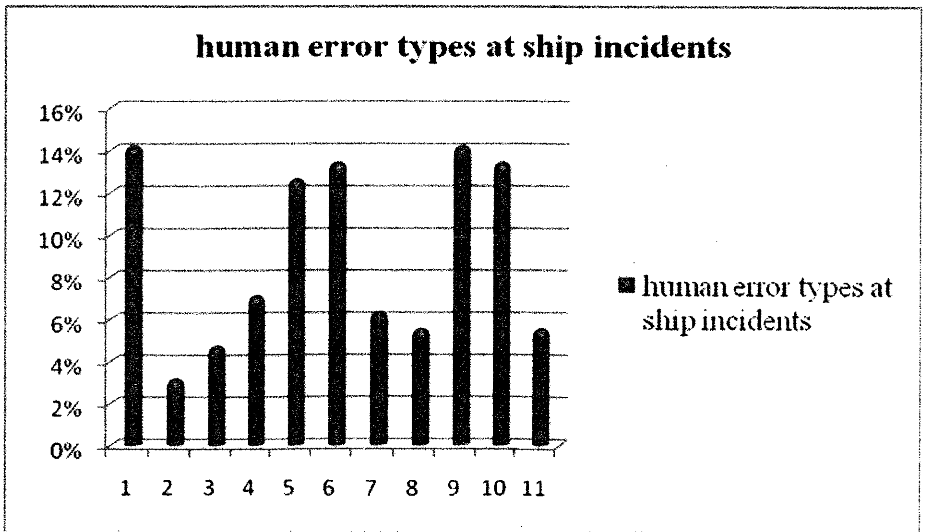


Fig. 5. Percentage distrubution according to human error types at ship incidents

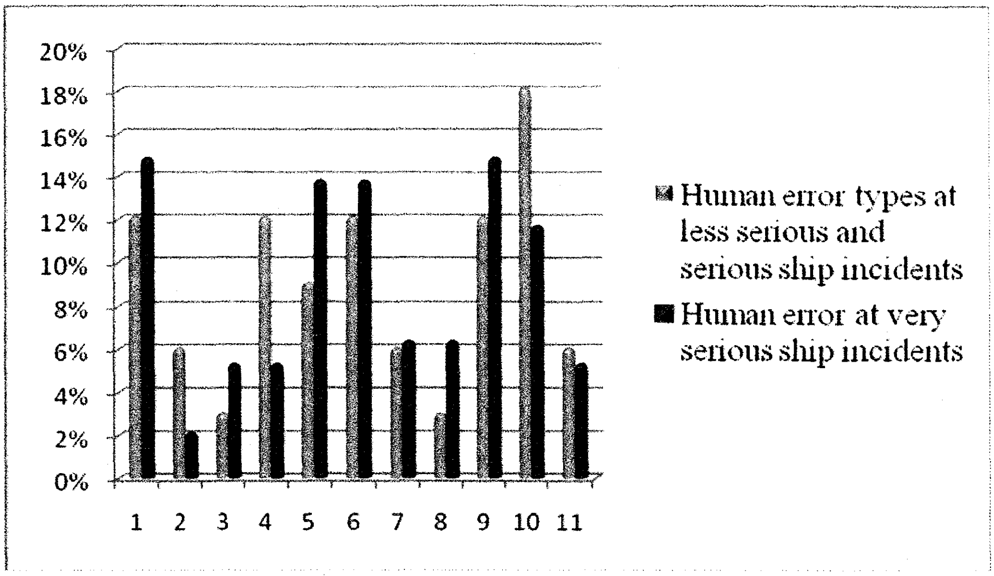


Fig. 6. Percentage distribution according to human error types at less serious – very serious ship incidents

4. MODEL STUDY ABOUT IMPROVEMENTS IN MARINE EDUCATION

The model study is student centered and provides the assessment of the student's competence in in-group cooperation, communication, task sharing, learning technological novelties by identification and practical operations, and leadership attributes. For the application of the model study, the obligation to comply with the course hierarchy with established boundaries was imposed on the student. The education in Maritime Faculty is structured as mathematics and basic sciences in the initial years, then vocational theories and methods and project and system oriented courses in the last years. In the scope of instruction structures this way, the "model" application for each course can be made more functional by dividing the course within itself into subfields and thus, the student can begin his career with relevant attributes that can neutralize the statistical parameters of the accidents.

Within the scope of faculty education program, the selection of two courses for sample application has been decided as "Electrical Laboratory" and "Automatic Control". Before moving on to the application, instructors of these courses have been trained and given information about the model and its application. Regarding the contents of the training, the instructors were informed about the basis of parameters' selection, how the parameters will be evaluated and how they can be applied in accordance with the course content. In this training, course plans have been scrutinized, examined and updated for improvement and a practice application has been performed on the instructors.

By taking into account the continuity of technological innovation; automatic control system's structural elements and the basic theory and numerical problem solution applications about the operational principles of these elements have been studied in automatic control classes. The same parameter has been addressed in Electrical Laboratory classes as well and the students have been exposed to practices about contemporary measurement devices and overcoming measurements problems. In both classes the student has been asked to bring resolutions for various error scenarios given in the scope of his individual knowledge and application level, responsibility attitude and implementations, through which the student targeted to gain education attainment towards giving the best decisions in case of encountering different problems in accordance with changing systematic structures. The student groups formed by educators and the student leaders nominated by a majority vote of these groups are targeted to attain communication and teamwork skills. For each practice study, the groups and the student leader had been changed. By this way, it is aimed for the student to show adaptation to changing circumstances. In Automatic Control class, in practices concerning level and temperature control, the student groups are asked to obtain the expected values and as a second stage, they have been asked to obtain same measurements again under certain disruptive circumstances. For evaluation of practice work, in case of a group's failure the student leader was deemed unsuccessful and in case of a particular student's failure in the group, that group's students have been deemed unsuccessful. The purpose of this evaluation is to instill the awareness that one personnel's failure within the ship management hierarchy may lead to damaging results for all crew members and even the passengers, if there are any. For Electrical Laboratory class, the student is asked to design a testing apparatus with a different purpose every week and regarding this, information about the goals, methods to follow and expectations has been given at the beginning of the class, and relevant methods to conduct analysis of the results have been taught. For the targeted work, the groups were given instructive schematic plans. The expected measurements were obtained by the groups that designed their apparatuses by correctively construing the plans; those who implemented the plans incorrectly couldn't get any results from their measurement apparatuses. The students are asked to detect their measurement errors by classifying them into environmental factors, human related errors and errors attributed to devices. In the automatic control class, different error scenarios were given to each group by the educator and the groups were asked to bring a resolution for their problem in the most appropriate way. The presentation of the projects and administration of discussions oriented at finding the most correct solution were enabled by cooperation of the group leaders and instructors. For the discussed project topics, group leaders were held responsible in case their group was unable to come up with a suggestion of correct solution. Therefore, the students were enlightened about the scope of leader responsibility and the responsibility of a group member to offer a solution to his/her leader. Of the model studies applied for two courses during the course of one term, the study concerning automatic control class is presented in the table below (Table 1).

Table 1

Model application for automatic control

Automatic control in maritime lecture term plan	Percentage distribution in term	Student evaluation	Student evaluation to human error types
General automatic control system in marine engineering, general automatic control system structure and controller types taught, general problem solutions and simulation studies	30 %	Every student was responsible individually from written exam, and practice exam about simulation studies on a computer	Knowledge and practicibility, personal responsibility, keeping rules, adaptation on new situation
Laboratuary studies on level and temperature control done by groups of students according to various fault scenarios	40 %	1) Laboratuary studies done with groups and a leader in students, and lecturer as a observer. 2) Groups and leader changed every studies by observer 3) Groups reported their studies to a leader. If a group didn't have solution, the leader had been unsuccessfull 4) If a student gave false responce in oral examination by observer, the grup had been unsuccessfull, although the group report was true	Ability to conduct multiple tasks simultaneously, operation, maintanence, observation and fault diagnosis
Projects on possible fault scenarios marine engineering automatic control systems	30 %	1) Project studies done with groups and a leader in students, and lecturer as a observer. 2) Project studies discussed with each group; if other group gave better solution a fault scenario, the group who was responsible the problem had been unsuccessful 3) A leader changed at every problem discussion, who was responsible with a class coordination 4) A leader decided the best solution, and a leader evaluated by observer	Decision to a pressured or emergency situation, keeping pace with technology development, communication

Model applications executed for a full term has positively affected the performance of the students in the ensuing classes. For instance; a student who has taken "Electrical Laboratory" class in accordance with the model has committed fewer errors in "Ship Electronics" course's practices and has been more successful in solving the encountered problems by thinking more comprehensively. Due to "Electrical Laboratory" class being a prerequisite for "Ship Electronics", the student has committed integrated errors in this course much less frequently.

5. CONCLUSION

As a result of the statistical study conducted by utilizing the data compiled from sample accident occurrences, it has been set forth the reality that the attainments which are supposed to be given to the students during maritime education need to much more diversified than the targeted levels during classical education are. While devising the model parameters, the questions regarding the assessment's content (What should be measured?), data collection method (Which assessment tools will be utilized by whom?), technical requirements of the assessment (is the assessment valid and reliable?) have been asked and how the results of the assessment will be utilized was inquired. The instructors of the classes selected for the model application were trained and the course plans have been updated within the scope of this training and their implementation was carried out. The most important deduction from this study was to reveal the necessity that the course instructor should concentrate on application and/or project work in such a way that would support student oriented learning. While instilling academic qualification into the student, a course structure that will support highly essential attributes like responsibility, leadership, analytical thinking, problem solving and discipline should be provided as well. It has been observed that motivation of the students participating in the courses selected for the model application have increased thanks to the application and the responsibility given to him during the application. However, since application and error scenarios are gaining importance and setting up laboratories for various vocational courses and diversification of laboratory equipment and inventories is required, the total cost of a quality maritime education is increasing. In order to lower the cost hike, the applications may be virtually carried out by appropriate software. Instructors in the academic crew should be supported to make them able to program these software products. Besides, graduation and post-graduate thesis work can be directed at the simulation to make the studies more diversified.

The model devised as a result of the conducted study is in conformity with STCW Convention of International Maritime Organization (IMO) and is suitable for their educational competence assessment and continuous watching; however the model parameters can be augmented to constitute a more detailed version. The most essential condition for applicability of the model is the educator instructing the course being trained about the model's materiality and adaptation of its parameters to his classes. Human related errors are expected to be significantly reduced due to systematic application of the model in institutions giving maritime education.

Referances

[1] Report on shipping accidents in the Baltic Sea area for the year', Helsinki Commusion Baltic Marine Environment Protection Commission, 2006.

[2] 'Report on Marine Accidents 2004', Japan Marine Accident Inquiry Agency.

[3] US Coast Guard Accident Statistics year: 1997 – 2007.

[4] The Thought Of The Seabus Incident' Cahit İstikbal,Marine News, April 27, 2009.

[5] Multivariate Statistics:Concepts, models and applications, David W. Stockburger Missouri State University, 1998.

[6] Electrical and Electronic Engineering of Modular Configuring Active Training Programs, Measurement and Evaluation'. Ahmet Özkurt, Damla Kuntalp, Dokuz Eylül University, Engineering Faculty, Electric and Electronic Division, 2002.

[7] Internal Maritime Casualties and Incidents reports, which are found in the website of Internal Maritime Organization Global Integrated Shipping Information System, 2009.

[8] Data Mining Using Matlab', Bachelor of Engineering, University of Southern Queensland Faculty of Engineering & Surveying, January, 2000.

THE PHILIPPINE SHIPPING INDUSTRY IN THE MARITIME WORLD

Ronald Raymond L. Sebastian,
Vice-Chairman, Board of Trustees
Administrator and QMR
Dr. of Philosophy in Maritime Education
John B. Lacson Foundation Maritime University
Iloilo City, Philippines
E-mail: marylou_la@yahoo.com

Abstract. The Maritime Industry Authority (MARINA) of the Philippines envisions the country to become a leader in the world maritime industry with highly competitive human and non-human resources as agents in effecting national development. This paper is a presentation and analysis of the Philippine shipping industry unraveled before the global maritime backdrop. It specifically identifies the features of domestic shipping and the type of cargoes handled, service differentiations and market competitiveness. Policies and projects for domestic shipping enhancement are delineated. The archipelagic condition of the Philippines makes domestic shipping inevitably vital and indispensable in order to link the country's 7,107 islands through efficient passenger and goods transport and other related services. Domestic shipping caters mainly to bulk, specialized and liner transports, the last under Philippine government regulation. Transport of goods and passenger takes the most sizable share of the country's merchant fleet and comprises the largest business of domestic shipping. Like any other business enterprises, Philippine shipping has suffered occasional fluctuations, enduring market slumps but only to regain market control and sustain economic recovery. Rates of return on equity have not been very encouraging, to say the least, due mainly to high fuel costs, limited increase in cargoes and passengers, and the attractiveness of faster air travel. On the average, travel by ship in the Philippines is relatively cheaper than air travel although understandably more time-consuming. In the Philippines, Negros Navigation leads and is the oldest among the top ten domestic shipping companies, registering the highest paid-up capital. The Philippines has lagged behind Japan, Korea and a few other Asian countries in shipbuilding. Some of the largest shipbuilders in the country are, in fact, foreign companies. It is recommended that the Philippine government take a bold step to accelerate the development of domestic shipping in the country through a massive modernization program for the industry. Substantial improvement must be made on port operation and management and on the weather report system. Domestic shipping services must be made more efficient and professional. Better qualified personnel need to be hired to deliver high-quality service.

INTRODUCTION / BACKGROUND

Philippine shipping has always played an important role in the country's economy, starting in 1571 with the galleon trade between Manila and Acapulco. The trade was quite successful in bringing mainly Chinese goods from the Far East and Manila to Acapulco aboard the galleons built in various parts of the Philippines. In return, Acapulco was the source of Mexican silver and other highly valuable commodities and metals for Manila especially for the Spanish residents and the affluent class in Manila. The Manila Galleon trade lasted until 1811 and its official abolition was in 1813 (Corpus, 1997: 39).

By 1818 the shipment of exports to the US and other countries were through Philippine ships and other cargo vessels, mainly in US, Japanese, British, and Norwegian ships.

The shipping industry expanded with the establishment of Negros Navigation in 1932, followed by several shipping companies which eventually closed shop. It was only in 1948 when the predecessor of what is now WG & A was established. In the 1970's, other shipping lines were established along with Sulpicio Lines and Lorenzo Shipping Corporation founded in 1973.

The role of domestic shipping in the socio-economic development of the country is highly critical considering that the Philippines has 7,107 islands that need to be linked with one another for the efficient transport of goods and services and movement of people. The nautical highway which links major islands is a step in the right direction as initiated by the present administration of President Gloria Macapagal Arroyo. Despite these developments, the share of domestic shipping in relation to gross domestic product (GDP) is relatively small. In 1990, domestic shipping industry accounted for only 0,6 % of gross domestic product (GDP). From 1991 to 2000, the share of domestic shipping of the GDP went to down to 0,5 %(Austria, 2003: 4). The significance of inter-island modes of marine transport is crucial as shown by the 99,9 % of inter-island cargo and 83,2 % of passengers carried by the domestic shipping industry. (MARINA-JICA, 2005: S-4).

With the latest technology in shipping, domestic and world shipping will have a more cost-effective operation.

Modernization of ship management has brought about ready and comprehensive support services on the management of ships. Ship owners as initiators of ship procurement can easily turn over their ship to reputable ship management companies.

PHILIPPINE DOMESTIC SHIPPING AND WORLD SHIPPING

Domestic shipping has three segments consisting of bulk transport, specialized transport and liner transport of agricultural products with fishing boats accounting for 70 % share. On the other hand, in world shipping the bulk is energy-related.

As to volume, the share of domestic shipping is only 0,6 % of the world shipping with containerized cargo having 0,9 % of world shipping. The domestic shipping industry has been unable to make a dent in world shipping. Likewise, its share in the domestic economy is only 0,5 % of gross domestic product.

Domestic shipping is dominated by a few shipping lines, namely the Negros Navigation, WG & A, Sulpicio Lines, Lorenzo Shipping, Herma Shipping and Transport Corporation, PNOC Shipping. On the other hand, world shipping enjoys an almost perfect competition due to the provision of ample and readily available funding.

The Philippine domestic shipbuilding, ship repair and ship breaking are also much smaller compared to the established giant shipbuilders in the world. The Philippines, of course, has the potential. After World War II, the country was next to Japan in shipbuilding but gradually lagged behind such other countries as Korea and Taiwan for various reasons.

In addition, the Philippines have a small share of overseas fleet dwarfed by the large shipping lines of Japan, Norway, Greece, and other countries.

The rates of return in domestic shipping have not been attractive to investors. It is noted that the country possesses topography conducive to shipbuilding, enticing Hanjin of Korea and Tsuneishi Shipyard of Japan to put up their shipyards in the country. With ample capital, it is possible for the Philippines to venture into huge-scale shipbuilding, ship repair and ship breaking operations, given the natural and human resources of the country.

Seafarers that man domestic and world shipping are important to the country and the world. Filipino seafarers aboard foreign shipping lines continue to be a major source of foreign exchange for the country. Filipino seafarers employed in domestic shipping lines get a lower pay than those on foreign shipping lines. Maritime accidents in the country may be attributed to the less qualified seafarers who man domestic ships; the more qualified get hired by foreign shipping lines.

Filipino seafarers are named the modern Filipino heroes for their extraordinary discharge of duties and responsibilities aboard foreign shipping lines. Many Filipino seafarers have received various recognitions from shipping companies and prestigious organizations abroad and from the Philippine government and civic organizations in the country.

Graduates of maritime higher education institutions in the country comprise the largest share in the deployment of seafarers in world shipping. Because only a very small percentage of graduates are employed in domestic shipping the maritime education institutions in the country tend to be linked more to world shipping than the domestic shipping industry.

Rationalization and quality assurance systems are in place in all maritime schools to assure the continuous generation of world-class graduates.

The demonstrated achievements of the maritime schools have affected a laudable impact on the development and growth of both domestic shipping and world shipping.

Governance and management is well on stream to sustain the continuing improvement in domestic and world shipping with the implementation of the Quality Standard System (QSS) and Quality Management System (QMS) consistent with standards observed by various prestigious certifying bodies in the world.

MARITIME EDUCATION IN THE PHILIPPINES

Maritime education in the country started with the establishment of Escuela Nautica de Manila in 1820 just a few years after the end of the Manila Galleon trade. The Escuela Nautica de Manila became the Philippine Nautical School in 1900 and much later, in 1963, became the Philippine Merchant Marine Academy. However, maritime education failed to expand even with the establishment of pioneering shipping lines of the Philippines, the Negros Navigation, in 1932. Privately-owned maritime educational institutions were later established beginning with the Philippine Maritime Institute (PMI) and the Iloilo Maritime Academy, now the John B. Lacson Foundation Maritime University (JBLFMU), both founded in 1948. Between 1948 and 1977, nineteen privately-owned maritime schools were established: five in Luzon; eight in the Visayas; and six in Mindanao. In addition, there is one government-owned maritime school, the Philippine Merchant Marine School. With the rising need for Filipino seafarers abroad, maritime education in the country had a tremendous increase in enrolment. More maritime schools were established in various regions of the country with Manila and adjacent cities having the biggest number. Bold initiatives to improve the outcomes of maritime education started with the identification of maritime schools that complied with the STCW '78 as Amended in the 1995 Convention.

GOVERNANCE AND MANAGEMENT OF MARITIME INDUSTRY AND EDUCATION

Governance and management of the maritime industry and education took shape with the establishment of regulatory agencies which have evolved to be critical entities for the promotion of excellence. The Maritime Industry Authority (MARINA) was established in 1974, the Maritime Training Council (MTC) in 1984, the Philippine Overseas Employment Administration (POEA), the Commission on Higher Education (CHED) in the 90's and others.

The STCW'78, as Amended in 1995, triggered more innovative strategies to improve governance and management in maritime education.

The state of the shipping industry and maritime education, as well as their governance and management has paved the way for the paradigm of this presentation that domestic shipping and

world shipping comprise such a dynamic and large sector that when supported with the quality of manpower in the maritime industry backed up by good governance and management, there will evolve a formidable industry that can propel the economic growth of the country and the world.

THE FILIPINO SEAFARERS

The Filipino seafarers account for 25,83 %, the largest group, among the overseas Filipino workers (OFWs). From 2000 to 2006, the growth rate was lowest in 2000 with 0,83 % and highest in 2006 with 19, 9 %. The contribution to the total OFW's remittances is shown as follows: 17,13 % in 2003, 18,3 % in 2004, 15,61 % in 2005, 14,27 % in 2006 and 15,69 % in 2007. Data reveal that the seafarers are not as well paid as the land-based workers although those occupying the highest position of Master Mariner and Chief Engineer are salaried at US $5,800 to US $8,500 per month.

The Filipino seafarers aboard foreign ships are getting much higher salary than those employed locally.

The salary ranges of seafarers are not reflective of the ITF negotiated level but are negotiated on the basis of the global salary to maintain the Filipino seafarers' competitiveness with those from other countries and to stabilize the employment of seafarers in world shipping.

A SCENARIO FOR A BETTER MARITIME INDUSTRY

Governance and management within the regulatory agencies and the maritime education sector are crucial. Good governance and management must be constantly in effect in the regulatory agencies and maritime education sector to assure the production of world-class graduates.

What is urgent in the governance and management of the maritime education sector, as it affects domestic shipping and world shipping, is the evolution of transformative education towards the formation of transformative leaders.

CONCLUSIONS AND RECOMMENDATIONS

On the basis of the aforementioned conditions in the Philippine Domestic shipping and world shipping, the following conclusions and recommendations are made:

Over the last 17 years, seafarers accounted for more than 20 % of overseas Filipino workers (OFWs) that reached its highest of 25,83 % in 2006. This is a healthy development and all sectors are called upon for support for a continuing deployment of seafarers of world-class quality and capabilities.

There is a need for the Philippines to sustain and strengthen the mutually beneficial relationship with countries with the largest registry of ships such as Panama, the Bahamas, Liberia, and countries where there is the concentration of ownership of world fleet such as Greece, Japan, Norway, the United States, China, Germany, Hong Kong, the Republic of Korea, Taiwan and the United Kingdom, to assure a continuous flow of seafarers from the Philippines. Norway and Japan, for example, have extensive programs in providing scholarship for students and employment of graduates of maritime higher institutions. Other countries should be encouraged to do the same.

Institutions involved in the maritime education, training, and research as well as manning agencies and employment agencies of seafarers in the Philippines should strengthen its relationship with the counterpart institutions in other countries.

To encourage college-bound students to go into the maritime profession, maritime higher education institutions should be strengthened in its continuing excellence in maritime education. There is also a need for information and career campaign.

There is a need to document the contribution of the seafarers through impact studies of maritime higher education institutions by region as well as studies on manning companies that have provide major employment to seafarers.

The profile of seafarers showed that a big majority (64,31 %) are ratings while only 35,69 % are officers. The officers contribute more to the economy than the ratings. Thus, there should be a purposive intervention to expedite the promotion of seafarers from ratings to officers.

Secondary education in the country should be strengthened in order that college-bound students are better prepared for college education, in particular, maritime education.

There ought to be a quantum leap in the financial support of maritime education in the country from business and industry, government and the non-governmental organizations (NGO's).

A more comprehensive package for scholarships with the accompanying employment and placement opportunities should be provided.

References

[1] Adansa, Estela G. [1999]. Research Methods: Principles and Applications. Manila: Rex Book Store.

[2] Amante, Maragtas S. V. [2004]. Industrial Democracy in the Rough Seas: The Case of Philippine Seafarers. Cardiff, Wales: SIRC-Cardiff University (part of the proceedings of the Industrial Relations Research Association in 2004).

[3] Arcelo, Adriano A. [2001]. Graduate Tracer Study – Higher Education Research Papers. Pasig City. Commission on Higher Education.

[4] Arcelo, Adriano A. [2008]. Sustaining Excellence in Maritime Education and Training through the NSA Scholarship Project. Iloilo City: John B. Lacson Foundation Maritime University.

[5] Arcelo, Marylou L. [1990]. "Maritime Education: Status, Prospects and Challenges- A Statistical Report on the State of Institutions Offering Maritime Programs in the Philippines." JBLCF Maritime Education Review. Vol. 1, Nos. 1 & 2.

[6] Austria, Myrna S. [2003]. Philippine Domestic Shipping Transport Industry: State of Competition and Market Structure. Makati: Philippine Institute for Development Studies.

[7] BIMCO/ISF [2005]. The worldwide Demand for and Supply of seafarers. Warwick: University of Warwick.

[8] Calimoso, Eloi A. [2008]. The Chinese are coming. Seaway Shipping Digest. Vol. 8, no. 1.

[9] CHED Memorandum Order No. 34, series 1999. List of Maritime Institutions which Complied with STCW '95 Requirements.

[10] Commission on Higher Education [2008]. Statistical Bulletin. Corpuz, Onofre D. [1997]. An Economic History of the Philippines. Quezon City: University for the Philippines Press.

[11] Eler, Geneva M. [2007]. On Career Pathing. The Dolphin, Vol. XXI, No.2.

[12] Fernandez, Eleanor. Best Practices in Maritime Education and Training as Perceived By Regulatory Bodies. International Maritime Conference on "Sharing Best Practices in Maritime Education and Training to Meet World Shipping Needs," January 29 – 30, 2008. John B. Lacson Foundation Maritime University, The Philippines.

[13] Fox, David J. [1969]. The Research Process in Education. New York: Holt, Rinehart and Winston, Inc.

[14] Frankel, Jack R. and Norman E. Wallen [2006]. How to Design an Evaluation Research in Education. 6th edition. New York: McGraw-Hill Companies Inc.

[15] Golay, Frank [1961]. The Philippines: Public Policy and National Economic Development. New York: Cornell University Press.

[16] Gonzales, Romeo V. et al. Transformative Education. Quezon City: Phoenix Publishing House, Inc.

[17] Guiang, Alcestis M. et al. [2006]. The PRC. JBLF Education Review. Vol. XV, Nos. 1 & 2.

[18] Hatol, Mag Cruz [2008]. Full Speed Ahead: Negros Navigation at 75. Manila: Negros Navigation Co., Inc.

[19] Leggate, Heather and James McConville [2002]. Report on an ILO investigation into the Living and Working Conditions of Seafarers in the Asia/Pacific region. Geneva: International Labour Office.

[20] Llanto, Gilberto M. [2005]. Competition Policy and Regulation in Ports and Shipping. Manila: PIDS-World Bank Competition Policy Project.

[21] Llanto, Gilberto and Leilani Basilio [2005]. Competition Policy and Regulation in Ports and Shipping. PIDS-World Bank Competition Policy Project.

[22] Maambong, Christopher [2006]. Responsible Agency in the Implementation of the Board Examinations, Issuance of Certificate of Registration and Endorsement." JBLF Education Review, Vol. XV, Nos. 1 – 2.

[23] MARINA-JICA [2005]. A Study of Domestic Shipping Development Plan in the Philippines. Manila: Maritime Industry Authority.

[24] National Statistical Coordination Board [2007]. Philippine Statistical Yearbook. Makati: Philippines.

[25] Pia, Lamberto V. [2005]. The Role of MARINA in the Philippine Maritime Affairs, JBLF Education Review, Vol. 15, Nos. 1 – 2.

[26] POEA [2007]. Overseas Global Presence: A Compendium of Employment Statistics. Quezon City: Philippine Overseas Employment Administration.

[27] Presidential Decree 474. The Creation of the Maritime Industry Authority.

[28] Puno, Renato S. [2009]. Leaders of Transformation. Commencement address at the 67thCommencement Exercises of the Institute of Law, Far Eastern University, The Philippines, March 30, 2009.

[29] Ramirez, Veronica Esposo [2003]. Philippine Maritime and Nursing Education Benchmarking with APEC Best Practices. Education and Globalization. Makati City: Philippine Institute for Development Studies.

[30] Ratha, Dilip et al. [2008]. Outlook for Remittance Flows 2008-2010. Washington, D.C.: The World Bank.

[31] SHIPDECO [1988]. Maritime Training in the Philippines. The Norwegian Shipping Development Company of Norway (SHIPDECO) and the Maritime Industry Authority of the Philippines (MARINA).

[32] Short, Roger [2008]. Advancing Towards Achieving Quality Global MET. Paper presented during the International Maritime Conference at the John B. Lacson Foundation Maritime University, The Philippines, January 29 – 30, 2008.

[33] Syjuco, Augusto L., Jr. and Clifford A. Paragua [2005]. Training, Assessment and Certification of Ratings Under Regulations II/4 and Regulation III/4 of the STCW Convention, as Amended. JBLF Education Review, Vol. XV, Nos. 1 & 2 (January – December, 2006).

[34] Tan, Edita A. [2008]. Human Resource Development and Foreign Employment Policies in Countries of Origin. World Migration. Washington, D. C.: World Bank.

[35] Tionloc, Ramon T. [2006]. The Role of the Maritime Training Council (MTC) in Philippine Maritime Affairs. JBLF Education Review. Vol. XV, Nos. 1 & 2.

[36] Travers, W. M. Robert [1978]. An Introduction to Educational Research. New York. McMillan Publishing Co.

[37] Vitriolo, Julito D. [2006]. A View From the Commission on Higher Education. JBLF Education Review. Vol. XVI, Nos. 1 – 2.

[38] Warsash Maritime Center [2002]. Improving the Training and Supply of Filipino Senior Officers Qualified at the STCW '95 Management Level: A Feasibility Study. Warsash Southampton University.

[39] Yamamoto, Hisashi [2008]. Globalization, Innovation, Knowledge. Paper presented at the International Maritime Conference at the John B. Lacson Foundation Maritime University, The Philippines, January 29 – 20, 2008.

SHIP MANAGEMENT PHILOSOPHY TO BE REVIEWED

Nikolai N. Grigoriev,
Professor, Admiral Makarov State Maritime Academy
Mikhail M. Nakonechny,
Deep Sea Captain
E-mail: M.Nakonechny@scf-group.ru

Abstract. Problems related to the training of the sea personnel and its further employment in the maritime industry depend mostly on the psychophysiological characteristics of the particular person. Therefore a close attention should be paid to the selection of the sea staff, especially to those employed on board the vessels carrying the cargoes potentially dangerous to the safety of the crew, the ship and the environment.

A number of negative features that compromise the safety of shipping characterizes today's global crewing market. And one of these that should be pointed out in the first place is the poor cooperation between shipping companies and marine educational institutions. If we look at the statistics we'll see that the most accidents at sea are caused by the wrong decisions and that the 'leaders' are those who are impelled to make a decision under dynamically developing circumstances. These are, first of all, the deck watch officers and pilots (25 % and 7 % respectively) in contrast to the engineer watch officers (2 %). It would be evidently wrong to draw a conclusion that the reason is in the different level of training of the deck officers and engineer officers. The reason lies in the ability of the human being to adapt continually to the dynamics of changing circumstances, what is, in fact, happening during the sea voyage, especially in the areas of intensive ship traffic. And the watch officer has to make a decision exactly under dynamically changing conditions. Owing to the absence of reliable scientific data, traditionally, the reasons are seen in a low level of theoretical knowledge and practical training(for the sake of justice we have to admit that nowadays a fatigue is mentioned as well). In order to improve the safety of shipping significant resources and time are devoted to training. Of course such approach brings certain results. But hardly the idea to make a professional soccer player from a man with a low level of reaction would come into somebody's mind. Today's state of crewing market is so that such professionally important issue as psychophysiologic qualities of seafarers are practically ignored. There are two main reasons of the above said situation. Firstly, it's the shortage of qualified officers which impels crewing offices to be content with random proposals from seafarers. Secondly, studies on problems of professional psychological aptitude demand additional resources. Few shipping companies are ready to invest in such studies and in implementation of its results in the sea transport. After all, a practical output is deemed to be in reduction of the accident rate. In such situations the Russian "trusting to luck" becomes an international concept. As trouble was passing by before it'll be passing by in future: "in for a penny, in for a pound". But, as it often happens, a greedy man pays twice". And if we mean a modern shipping, the losses born due to the accident of the vessel carrying dangerous cargo may be considerably more than "twice". Therefore, to the existing measures, such as theoretical studying, practical training, medical examination, or to the measures intended for implementation, such as investigation of the influence of the fatigue on human behavior, conflict settling learning, psychological aspects of the selection and training of seafarers, meaning their ability to act effectively and for a long time under stressful circumstances of dynamically developing situation, should be added. The following psychophysiologic activities should, in the first place, be the subject to investigation: spatial imagination, visual memory, visual perception, ability to switch over attention, on-line memory, ability to decode sign information.

Correlation and quality of combination of the above listed factors is very important for taking timely and correct managing decisions. However, to consider the above said qualities only would not be enough for ensuring all aspects of the safety of shipping. Directly or indirectly those qualities depend on other important mental faculties and personal characteristics.

Studies of the influence of the psychophysiological qualities on the decisions taken has not been taken into consideration on board the sea vessels so far except, perhaps, for nuclear icebreakers which can hardly be rated as significant in regard to the number of the world fleet. Ever increasing intensity of shipping, the character of the dangerous cargoes being shipped demand more and more proper attention not to the quality of teaching and training only but to the psychophysiological characteristics of seafarers as well. The work on detecting the psychophisiological characteristics of seafarers should be started from the moment of his entering the marine college or academy and continued all along his sea career. First of all it's necessary to define the professionally important characteristics of every sea profession. As a result some kind of a document called, say, "psychological seaman's passport" should be drawn up. Such passport should, similar to the seaman's book, accompany a seafarer during all his sea career. Every change of psychophysiological characteristics and measures taken for their correlation shall be registered in such "passport".

It's quite clear that under dynamically developing circumstances during the sea voyage such characteristics must cause the anxiety of ship owners. Taking into consideration the fact that a verbal intellect determines the ability to deliver and to receive information as well as to learn it, an importance of this mental faculty becomes evident.

The intellectual lability determines an ability to switch over from one form of mental activity to another.

The level of erudition is determined by the general familiarity.

The characteristics that are above the "norm" fraught with serious consequences also.

Hence, the combination and correlation of the above mentioned characteristics make significant contribution into those 80 % of human factor which affects so much the accident rate at sea. Adding to the above said the lowering of the level of training, the loss of prestige of marine profession, the fatigue and other negative factors we can make a conclusion: the shipping business goes through a deep crisis. Therefore, only the comprehensive, detailed analysis of all processes affecting crewing policy and the working out of radical measures aiming to bridge a gap can lead the shipping out of the existing situation.

To illustrate the above said let's have a look at the data placed at the official IMO site. Please note, that the data cited hereunder may differ considerably depending on the nationality of the interviewees, but, in general, the character of the results coincides.

Table 1

Reasons for Choosing a Job at Sea
22,4 % – I wanted a career at sea
18,4 % –To see the world
16,0 % – For money
15,8 % – Better wages than jobs at home
7,6 % – Famely tradition
6,0 % – Other reasons
4,8 % – Better prospects at sea
4,8 % – In my country, a seagoing career is a well-respected
2,4 % – Thought life at sea would be lees stressful than at home
1,9 % – Working conditions are better than at home

To analyze the data shown in tables 2 – 4 we shall take advantage of the so called Maslow's pyramid. To do so we'll bring together the data from tables 2 – 4 in aggregate table 5 where the data will be distributed by columns: «Reasons for Choosing a Job at Sea» (1,3), «Reasons Staying at Sea» (2,3) and Realization of expectations «The Worst Aspects of Career at Sea» (4,5) in conjunction with Maslow's pyramid. As seen from the table(columns 1,2) upper line related to self realization shows 22,4 % and 12,4 %. At the same time columns 4 and 5 show that shortcomings work at sea are accumulated in 3 lower lines of the pyramid. It goes without saying that in future more profound studies have to be carried out but naturally it will require additional resources.

Table 2

Reasons for Staying at Sea
27, 5 % – I earn a good salary that I cannot mach ashore
17, 8 % – I enjoy a high lavel oa job satisfaction
12, 4 % – I want to sail as Captain (Chief Engineer) before coming ashore
11, 3 % – I want work at sea until retire
9,7 % – Other
5,9 % – Working away from home suits me best
5,7 % – I am saving my salary to start a new career \ businewss ashore
5,4 % – I have a large number of dependent who rely on my salary
4,3 % – I am saiving to buy a house before moving ashore

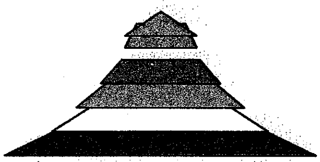
Table 3

The Worst Aspects of a Career at Sea
67,6 % – Long time spent apart from family and friends
34,1 % – Too much paperwork
29,7 % – Time spent away from children
22,3 % – Fatigue
19,7 % – Fear of being treated like a criminal
18,3 % – Onboard living condition
17,5 % – Difficult to keep contact with home
15,7 % – Lack of shore leave
14,8 % – Crews are too small to share workload
10,0 % – Few career opportunities
9,6 % – Loneliness
7,9 % – Concerns about accidents at sea
7,9 % – Lack of onboard recreational facilities
4,8 % – No privasy
4,4 % – Piracy
0,9 % – Bullying

The best practice of the most successful companies shows that the employees should always be treated with due respect. Respect may be expressed in different ways. There is no single recommendation. Everyone has to search for solution all by himself. It should always be kept in mind that each person may have his own problems, ambitions, abilities, anxieties, goals, etc .Obviously, the ideal situation is, when the targets of the employee and employer coincide.

An employee should always have a possibility for promotion. The best alternative is when an employee makes his way up in his own Company, though outsiders should be considered as well. Total absence of outsiders gives birth to self-satisfaction and this is the worst enemy of any organization.

Table 4



Reasons of Choosing a Job at Sea %	***Reasons Staying at Sea %***	***Needs (according to A. Maslow)***	***Realization of expectations The Worst Aspects of Career at Sea %***	
1	2	3	4	5
22.4		***In self realization***		
		I wanted career at sea		
	12.4	*I want to sail as Captain (Chef Engineer) before*		
		Cognitive and aesthetic (in order, justice, beauty)		
18.4		*To see the world*		
4.8		*Better prospects at sea*		
		In respect (in approval, gratitude, recognition, competence)		
	17.8	*I enjoy a high level of job satisfaction*		
		In affections (love, belonging to group)	*Long time spent apart from family*	67.6
7.6		*Family tradition*	*Loneliness*	9.6
4.8		*In my country a seagoing career is a well-respected profession*	*No privacy*	4.8
		In security Physical and psychic	*Too mach paperwork*	34.1
			Fatigue	
2.4		*Thought life at sea would be less stressful than at home*	*Crew are too small*	22.3
			to share workload	14.8
1.9		*Working condition are butter then at home*	*Piracy*	
		I want to work at sea until I retire		
	11.3			4.4
		In security phisiological (food, drink, oxygen)	*Onboard living condition*	18.3
16		*For many*		
15.8		*Better wages than job at home*		
	27.5	*I earn a good salary that I cannot match ashore*		

There are exactly the employees that create the reputation of the Company they work for. And it's well known that advanced Companies consider the reputation as one of their main assets. Management of the ideas of social relations should become a corner stone of the Company policy. The shipping companies where, for the same work, captain-non citizen of the flag state is paid less than citizen can't rely on the loyalty of the former. Globalization of the crewing market has led the shipping industry on the wrong way recruiting seafarers with the low level of competence or non competent at all .Such step will definitely contribute to further reducing of the safety at sea. Psychophisiological component forming part of "human factor" will worsen the situation even more. Shipping companies should upgrade the philosophy of business management. First of all, they have to establish the long-standing relations based on social and economic grounds with the educational institutions

CONCLUSION

Crisis of social and psychophisiological factors on the shipping crewing market is fraught with danger to the ecology of our planet. Accidents with the vessels carrying dangerous cargoes inflicted significant losses to the environment. And in the most cases the cause of the accident was the human factor, further ignoring of which in crewing policy will lead unavoidably to the irreplaceable harm to all the humankind. Assuming the fact that 90 % of the world transportations is carried out by the cheapest kind of transport- the sea transport, we have to understand that such "cheapness" is quite relative. It's high time to admit that chasing profit has become the reason of increase of sea trade. The world community should start to think over what for and whom for the sea trade is increasing so quickly. Is there real need in such increase if it threatens the existence of the humankind itself. Well known Russian writer and philosopher Fedor M. Dostoevsky was absolutely right claiming that "happiness of the whole world is not worth the single teardrop of one tortured child". It's not right to place the humankind on the brink of disaster for the sake of illusory profit. On the contrary, an adequate price should be set to ensure the safety at sea.

RESUME

We are convinced that the following steps are to be undertaken the soonest:

- To carry on the scientific research in ergonomics of marine professions in order to justify the level of effective and safe work of seafarers;
- To define and to establish the standards of professionally important characteristics of marine professions. Basing on the above research to implement a new document-"psychological seaman's passport" where dynamics of professionally important characteristics of the employee will be fixed all along his sea career;
- To review the philosophy of shipping establishing the relations with marine educational institutions targeting on selection of entrants, education of specialists, work out and realization of educational standards corresponding to the modern demands of the Shipping companies as well as their employees;
- To ensure professional selection and monitoring professionally important characteristics of seafarer.

References

[1] Григорьев Н.Н. Как обустроить систему морского образования России // Транспорт Российской Федерации. – 2008. – №1(14).

[2] Григорьев Н.Н. Белые пятна морского образования // Транспорт Российской Федерации. – 2008. – №5(18).

[3] Go to sea! A campaign to attract entrants to shipping industry. IMO In association with ILO BIMCO, ICS/ISF, INTERCARGO, INTERTANKO, ITF. November 2008. Lee Adamson, ladamson@imo.org Natasha Brown, nbrown@imo.org.

CONTRACT-BASED SEAFARER TRAINING: WAYS OF IMPLEMENTATION

Sergey A. Ogay,
Dr., Rector, Maritime State University named after Admiral G.I. Nevelskoy
E-mail: ogay@msun.ru
V.F. Gamanov,
Deputy Rector, Maritime State University named after Admiral G.I. Nevelskoy

Abstract. The paper covers the issues of seafarer training in present-day Russia and ways of finding feasible solutions. It states that the international shipping industry is on the rise while the problem of ship officer shortage remains grave. The author makes it clear that seafarer training and job placement issues are inseparable from the global trends, still there are some specific features. The peculiarities of the Russian system of maritime education and training are dwelt upon as well as the roots of the specific problems are, as the whole system of higher professional education and training in Russia has undergone dramatic change. The model of contract-based seafarer education and training is presented, paying attention to possible options. The ways of implementation of such system are given, substantiated by appropriate figures and data from the Russian shipping industry companies as well as by extracts from the MSU syllabi. The conclusion is made that trough the combined efforts in implementation of the proposed models Russian system of maritime education and training will be capable to meet the challenges of the XXI century in supplying well-qualified and skillful seafarers to the shipping industry both in the home market and internationally.

INTRODUCTION

International mercantile marine keeps growing, and there are no signs of slowing down its development. World shipbuilding is booming. Highly sophisticated and environmentally safe ships continue replenishing the world merchant fleet.

Shipping is involved in globalization to a far greater degree than other sectors; ship owners enjoy the right to employ crewmembers in any part of the world. But despite all the above achievements, here emerges the question: who will con the ships and control sophisticated equipment ensuring the ships' safe and accident-free operation.

The world economic crisis makes allowances in the process of marine transport development, but the tendencies and problems this sector is facing remain.

Any country can only have a guaranteed recruitment of seafarers for her national fleet at the expense of redundant specialists wishing to continue their careers as crewmembers which will ensure healthy competition as a stimulus for further development of principles of safe navigation, preservation of the environment and commercial effectiveness of fleet operation. Today, however, the shipping sector is facing an unprecedented lack of personnel. According to assessments made by some experts, shortage of only ships' officers will be from 27 to 45,000 people in the nearest future. The same sources claim that this tendency can redouble taking into account the fact that the amount of ships increases by 1 % annually.

CURRENT SITUATION WITH SEAFARER TRAINING IN RUSSIA

The global critical situation with providing the world fleet with well-qualified officers affected Russia too. The number of young people wishing to make a marine career is decreasing sharply. Well-trained graduates of Russian marine institutions increasingly find employment in shore-based organizations; those wishing to work at sea choose foreign companies where payment is higher, working conditions are better and social package is thicker.

Every high school leaver faces the problem of choosing his/her profession; here prestige of a profession is a decisive factor. The very notion of prestige related to a profession/specialty implies the essence of the attitude on the part of an individual and the whole society towards the factors underlying a common idea of attractive career and consequently, quality of life.

The prestige value of marine career is a special theme to be discussed separately and protractedly. Today we can only mention that high-quality level of entrants to seafaring jobs is a prerequisite for further work with cadets and their successful employment. The notion of marine romance lost its attractiveness for modern young people long ago. Hard labor of a well-skilled seafarer deprived of advantages that work and leisure ashore gives is becoming less and less prestigious for a young person spoilt by civilization amenities. This is why an appropriate payment for such labor that can guarantee a worthy life to a seafarer and his family members becomes a prevailing factor when one chooses seafaring as his/her profession. It would be of interest to mention here the results of studies conducted by the Russian Maritime Registry of Shipping where the students' and cadets' motivation to work in the shipping sector was analyzed. The results of the survey were made public at by N. Reshetov, Director General, Russian Maritime Registry of Shipping [1].

According to the data he quoted, the young people's decision to get maritime education was influenced by: security of interesting employment upon graduation – 44 %; their relatives', friends' and acquaintances' recommendations and family traditions – 26 %; Prestige value of maritime education – 22 %; and only 5 % believed shipping companies' guarantees. Distrust for shipping companies' promises is a serious warning for the companies to take into consideration.

68 % of respondents are planning to devote their life to marine career upon graduation, and 15 % have not decided yet. However, out of the group intending to work aboard marine ships only 19 % are going to work there till their pension age; 27 % intend to work there till they are promoted to the rank they wish; another 27 % are planning to do so till they find a higher-paid position ashore, and 22 % more are going to work as crew members till they save enough money to purchase real property. Thus, most young people consider their marine career as a temporary arrangement and they are not prepared to carve out such a career during all their life span. It is, therefore, equally important for a seafarer working with a shipping company to gain an offing to carve out his/her career and be secure socially working either at sea or ashore.

The personnel problem and the image of a shipping sector are interconnected; therefore, the approach to correcting the situation should be system-based. Need to increase shipping companies' responsibility for training of their ships' crews is one of the aspects of the systemic approach; it fully corresponds to the IMO idea that maritime education and training should become an integral part of shipping industry.

The image of the Maritime University as a source of marine manpower has been created, and the authority of the institution is quite high especially in the Primorsky Krai. Now it is essential to develop the results achieved and outreach Siberia and other parts of Russia. The University has started such activities. The MSU team visit to a Fair of Professions held in Irkutsk showed a great interest of young people staying in that region to the Maritime University.

ROOTS OF THE PROBLEM

After the USSR collapse, a conundrum was shaped in the Russian system of maritime education and training and on the seafarers' labor market. The government funds marine specialists' training with budget means, but foreign shipping companies use its results; as a rule, the best graduates find employment with those companies. This fact takes toll on the situation in the Russian shipping sector. Taking into account the prospects of the fleet growth and increase in cargo transportation aboard ships hoisting the Russian flag, we can expect aggravation of the personnel problem. The following specific features are typical for the system of marine specialists' training under the present-day conditions:

- The graduates whose training was funded by the state budget get employment aboard Russian ships hoisting foreign flags;
- There is a steady drift of the best graduates to foreign shipping companies where high payment, comfortable labor conditions, reliable insurance, work and vacation interchange acceptable for one's health, before-the-voyage training, re-training and career development are guaranteed;
- Deficient funding of maritime institutions during quite some years led to aging of marine training facilities, low payment caused loss of a teacher's profession prestige, drift of young specialists from maritime institutions and faculty aging;
- Constant growth of requirements to maritime training;
- Poor high-school training makes it necessary to arrange correction courses for entrants so that they could meet international standards.

But the short time it takes for our graduates to adapt themselves to the best modern ships assures us that the Russian system of maritime education and training ensures the level required of marine specialists.

According to a number of Russian shipping companies and the Union of Russian Shipowners, we should get back to the system of rigid career assignment so that a graduate would have to work for a certain period (of three years) wherever he/she was allotted. The system of compulsory work for young specialists as junior officers would help resolve the problem of the heaviest deficit of personnel.

Under the conditions of open seafarers' labor market, however, a young specialist's mandatory employment aboard ships of the companies that aren't good enough for a young specialists due to various reasons, won't resolve the problem of graduates' long-term employment with those companies. Upon expiration of the term of mandatory assignment a specialist that has gained work experience will leave for a company more acceptable for him/her unless the company where he was employed creates competitive labor conditions. Thus, the Russian graduates' mandatory career assignment system will help fill in career placements with prestigious, mainly foreign companies.

In addition, the company that is to employ graduates might face personnel disproportions owing to regular filling of junior positions by young specialists and slowing renewal of experienced instructing seafarers. Thus, the mandatory career assignment system based on government allotment without a company's additional efforts to create conditions for the graduates' long-term work with the company won't resolve the problem comprehensively. The current system of employing the Maritime University graduates is based on applications about demand submitted by shipping companies and contracts with shipping companies. Hand-on experience of contract relations with companies implies partial reimbursement of expenses for cadets' practical certified training and imposes obligations on graduates to arrive at a shipping company for employment.

Data on demand of shipping companies in young specialists as they were submitted are shown in Table 1.

As the Table shows, there is a steady deficit in young specialists. Taking into account hand-on experience and cadets' expulsion during their training, to meet the shipping companies' demand in specialists – junior officers, the intake of entrants to seafaring specialties should be 50 % more right now. The resources required for high-quality training is another essential aspect of seafarer training.

Snip officer training is an expensive matter. On the average Roubles 1.0 – 1.2 million are allotted for training one cadet on the government order now. This is quite a big amount, but it is yet not enough.

The University annual demand for budget funding is calculated on the basis of the current normative documents; the amount stated there is three times more than the means allotted. Thus, the demand in funding is satisfied approximately by 30 %. Naturally, the question of finding the deficient means that could be used for renovation of facilities, raising the teachers' social status and new teaching aids arises.

Table 1

DEMAND of Shipping Companies in Young Specialists – Seafarers in 2005 – 2008

Item	Shipping Company	2005	2006	2007	2008	Total
1.	FESCO	100/85	85/65	30/30	30/24	245/204
2.	PRISCO	43/35	41/39	52/52	66/51	202/177
3.	SMP	22/ 10	27/19	34/20	18/2	101/51
4.	PRIMTANCO	17/6	25/12	19/10	38/24	99/52
5.	RIMSCO	27/12	28/16	50/35	37/9	142/72
6.	FESCOCONTRACT	36/15	62/14	65/25	65/56	228/110
7.	ARCTIC SHIPPING COMPANY	6/2	6/4	6/4	12/6	30/16
8.	HERMES	6/2	6/2	7/2	5/2	24/8
9.	MEGAMARIINESERVICE	-	-	-	16/6	16/6
	TOTAL:	**263/167**	**286/171**	**269/178**	**287/180**	**1105/696**
	SHORATGE IN PROPORTION TO DEMAND (%)	**36.5**	**40.21**	**33.83**	**37.28**	**37.01**

Nominator: the number demanded, consequent: the number assigned.

The Federal Target-Oriented Project "Development of Russia's Transport System" (2010 – 2015) assigns Roubles 5.042 billion for renovating the University facilities. When carried out, five investment projects within this Federal Project will make it possible to upgrade simulators, laboratory equipment drastically and put into operation new academic facilities. However, no program envisages increase in current funding. There is specialist training funding shortfall for toady and for the near future.

MODEL OF CONTRACT-BASED SEAFARER TRAINING

In this connection, the task of improving the quality of specialist training should be resolved comprehensively: by concentrating the resources available and finding additional sources. Let us look at the figures.

For instance, the University spends Roubles 1,055,000 for one future navigator's training. The first three years cost the treasury: Roubles 191,460, 236,790 and 212,694 respectively. It is the period of carrying out the so-called Federal Educational Standard. The rest three years of taking special subjects are funded by the budget to the amount: Roubles 141,538, 140,656 and 131,844 respectively, thus totaling to Roubles 414,038.

At the same time, to ensure specialists' training in compliance with their respective specialization (oil tanker, gas carriers, bulkers etc.) specialists possessing shipboard work experience should be engaged;

additional simulators and laboratory equipment and also new teaching aids should be provided. As an example, a list of additional subjects for training universal engineers including those working in gas carriers is given in Table 2.

Table 2

SUBJECT	Hours			Term paper	Term project
	Total	Class hours	Solitary work		
Ship's Steam Turbines	80	50	30	1	
Ship's Main Boiler Installations	80	50	30	1	
Ship's Auxiliary Power Equipment of Steam Turbine Installations	80	50	30		
Maintenance of Steam Turbines	80	50	30		
Special Systems of Oil Tankers	80	60	20		
Special systems of LNG Carriers	80	50	30		
Oil Tanker Familiarization Course	72	40	32		
Oil Tanker Specialized Course	72	40	32		
Chemical Tanker Familiarization Course	72	40	32		
Chemical Tanker Specialized Course	72	40	32		
Gas Tanker Familiarization Course	72	40	32		
Gas Tanker Specialized Course	72	40	32		
Environment Pollution Prevention	32	16	16		
Dual Fuel Ship's Diesel Engines Operation	32	16	16		
Total in Ship's Engines Package	**976**	**582**	**394**		

Amounts of hours for new courses and, consequently, their provision depend on a specialty and specialization.

According to preliminary estimates, the amount of additional finances required is nearly the price of training one cadet in his/her 4th, 5th and 6th years, i.e. it is equal to Roubles 400 – 500,000.

As it was noted previously, there is an experience of compensating by shipping companies for a part of practical certified training to the amount of US$ 2,000 – 3,000.

The contracts made between companies and the University state the amount of compensation; on an average it is equivalent to US $ 2,000. For quite some time the University has practiced such contracts with PRISCO (the agreement was canceled in 2008), FESCO and FESCONTRACT Companies. Partial compensation was stipulated in the contract of practical training with RIMSCO and PRIMTANCO

Companies. This arrangement is especially efficient if a company selects future graduates at an early stage of their training and tripartite contracts are made. The contracts stipulate additional scholarship, practical training (if possible in a capacity of regular employees) and guaranteed employment. It is our present-day arrangement with FESCO and FESCONTRACT Companies. The FESCO only makes contracts with graduates, but there is no contract with the University on rendering educational services.

A new model of contract training offered by the University is based on the following principles.

All the cadets undergoing training at the University should be involved in the system of contract training.

The University undertakes the obligations exceeding the current academic standard of conducting additional courses ensuring specialization required for a certain shipping company.

A shipping company undertakes to provide additional resources for a specialist's training to the amount required for the University to conduct additional courses ensuring a graduate's specialization.

A trainee undertakes to complete the program of his/her specialty including all additions stated by a corresponding shipping company, to get the certificates stipulated by the International Convention for obtaining a Certificate of Competence and work aboard ships owned by the Company during the contract term.

The tri-partite contract covers the matters of:

- Employing for a period of shipboard training;
- Cadets' catering during their shipboard training aboard the Company ships;
- Covering transport fares up to the port where shipboard training starts;
- Allotting supervisors for the period of shipboard training.

Additional resources for specialists' training that a shipping company undertakes imply:

- Money means;
- Guidance materials, laboratory and simulating equipment;
- Expenses for training and re-training including fieldwork for instructors of special subjects;
- A part of expenses for shipboard training.

On the whole, the up-dated model is in many respects similar to the University-Company-Cadet contract relations materialized today. The difference is that the amount of resources to be paid by a shipping company is significantly bigger; consequently, the amount of obligations that the University undertakes is also bigger.

Another model of specialists' training through contracts with shipping companies is feasible. It is aimed at satisfying the demand of companies wanting specialists to the fullest. For example, a government order guarantees to cover 70 % of a company's demand in specialists. The rest 30 % are to be covered by contract training. In this case companies undertake to finance specialists' training staring from their first year in full. By doing so a company has the right to order the appropriate quality of training. It is evident that the trainee's commitments are to be tighter. Such a form of contract training is being used by the Admiral Ushakov Maritime State Academy, Novorossiisk and Novoship Company. The fact that the cadets selected are former servicemen guarantees a positive result. Their training is conducted under the program of secondary vocational level. In 2007 – 2008 the average cost of training was about Roubles 180,000 per year per one trainee. In addition, this form of contract training is being widely used in railroad transport.

Shipping community repeatedly suggested applying the law on alternative service currently in force in Russia to young specialists working aboard Russian merchant fleet. It would help resolve the problem of personnel shortage.

The current legislation of the Russian Federation does not permit to use this law directly for the benefit of shipping companies. Appropriate amendments should be made in the current legislation.

But the idea seems to be attractive. In our judgment, the model of contract training where a law on alternative service is applied could be like the following.

An applicant signs a contract that guarantees him/her a fare up to the place of training and subsistence and lodging. There are two options for funding:

- at the expense of a company participating in the contract;
- at the expense of an institution that received extra budgetary resources for training specialists for companies.

The contract stipulates paying scholarship and other material support (fare to go on leave, clothes, individual facilities for augmenting learning such as a laptop, player, dictophone etc.) by the company ordering specialists. The second part of the contract comes into force on the day of admission to an institution; it includes signing by a cadet of commitments to follow the institution statute, to live a healthy way of life and to be ready to work in specific conditions of the sea, to master a course of naval training, to go for acculturation and to be intent on self-improvement including elements of improving educability.

The institution commitments toward a cadet are stipulated in the statute. The ordering company ensures shipboard training aboard her ships or ships owned by another company of the type that the ordering company is planning to purchase. The company makes unhindered propaganda of her corporate interests and brings up the cadets in the spirit of loyalty to the company during their shipboard trainings.

The contract is made with an applicant for the term of entering an institution, training, shipboard training and naval practice, for the terms of leaves and mandatory work in the shipping sector. For instance, an applicant that chose the higher level of training in ship navigation in sea routes makes a contract for eight years and approximately eight months.

The government is a guarantor of purposeful spending of budget means in compliance with the regulations of boarding schools and guarantees work in the sector that should be supported by the company of the sector.

The model of contract training combined with alternative service is attractive for cadets taking courses of secondary vocational training and who do not have occupational determent.

The three models of contract training analyzed above can be tentatively called as follows:

Model 1: Refund for Specialized Vocational Training;

Model 2: Full Refund of Expenses for Training;

Model 3: Training Combined with Alternative Service.

Evidently, other models of contract training, versions and combinations of the models presented are possible.

We think that the first model is most feasible today; we present it to shipping companies so that they could use it as the basis of their contract relations with the University.

The question we examine today was discussed with Russian Far East companies at an extended session of the University Academic Council in 2007. We received definite proposals with regard to the examined question on the eve of preparing for the Guardianship Board sitting from FESCO, SMCO and RIMSCO companies.

CONCLUSIONS

Further development of shipping industry worldwide and in Russia as an integral part of the world economy is inconceivable without a profound and flexible system of maritime education and training capable of meeting the challenges of the new era of globalization. The maritime education providers keep on seeking such forms of education and training that would satisfy the demand on the part of the industry to the fullest extent. Still certain problem persist. Russia is no exception, though there are some peculiarities caused by the fact the whole system of higher professional education and training has been undergoing a long and painful process of change since the USSR collapse and replacement of socioeconomic formation. As FESCO Managing Director V.N. Korchanov says, "Today the Decree on Target-Oriented Contract Training of Specialists of Higher and Secondary Vocational Level is not working; in fact, the means allotted by the government budget for training seafarers are to a great extent spent for training specialists for foreign ship owners".

However, this Decree is primarily related to training personnel at the expense of budget means of budget enterprises, organizations and institutions. Territories of the region act as ordering parties of contract training. For instance, today the University is carrying out training of navigators and engineers to the order of the Sakha Republic (Yakutia). To make it possible to apply this law in order to secure personnel for shipping companies, significant alterations of the current Decree are required; they are likely to cause deep changes in the legal framework. This matter is to be specially worked out.

Summing up the analysis presented and proposals worked out, the Maritime State University suggests that the following considerations be taken into account:

- Model 1: Refunding for Specialized Vocational Training as the most acceptable model of contract training of specialists today;
- Shipping companies to build their relations with the University on the basis of this model-based contract;
- Thorough study of the option of supporting special research of forms of contract training of specialists.

Through the combined efforts in implementation of the proposed models Russian system of maritime education and training will be capable to meet the challenges of the XXI century in supplying well-qualified and skillful seafarers to the shipping industry both in the home market and internationally.

References

[1] Reshetov N. The XI International Seminar "High-Quality Shipping: a Standard of the XXI Century. Seafarer's Profession: Factors of Prestige Value". St-Petersburg. – 2008.

PARTICULARITIES OF CADETS PRACTICE INSIDE OF A MULTINATIONAL CREW

***R. Hanzu-Pazara*,**
Lecturer, PhD
***L. Stan*,**
Lecturer, PhD
***N. Grosan*,**
Lecturer, PhD candidate
***A. Varsami*,**
Prof. Assistant, PhD candidate
Constanta Maritime University
E-mail: raduhanzu@yahoo.com

Abstract. For today moment, the shipping industry is a multinational one. All activities in this industry are based on interaction and collaboration between people's from different counties and cultures. In an international company these details are common, due to company necessity in having offices placed in different countries according to business interests. But these aspects become more complex when we refer to onboard ship activities. For this reason is necessary to observe and study the kind of compatibilities or non-compatibilities that exist between seamen from different countries in order to create a proper working environment onboard the ship. These problems are even bigger when we talk about a person on its first experience onboard the ship and especially in a multinational and multicultural crew. This category includes cadets and young officers who made their practice stages onboard school ships or ships under native national flag. In present paper we intend to illustrate different elements encountered in human resource management and their appliance in a multinational crew situation, to see how is to work inside of a multicultural crew as cadets or younger officer, through experiences of our university students during their onboard practice on different ships with different nationality crew members.

INTRODUCTION

Starting from the 90's the concept of single nation crew had become less met on the world level. This situation has caused by the transfer of ships from the public sector to the private one, especially in the eastern European countries and along with the ship flag changing under a more permissive one. These changes accelerate the implementation of multination crew onboard ships, the new owners' needs to put their own people in the ship's management positions and also to cover the rest of onboard positions with so possible cheapest hand work.

The new conditions will be not represents a problem if crews from the changed owner ships' will be prepare to face this change. Put in front of a new working environment, many seafarers had accommodation problems, difficulties in working relationships onboard and the biggest problem has been created by the use of a foreign language, mostly English, in the daily duties communication. Many of these first unpleasant conditions have been covered by the option of a most attractive payment, the salary onboard of these ships been higher than for the same position onboard of a national flag ship.

Was necessary a long period to accommodate seafarers to the present situation, but it was usefully, because the crews was familiarized with the ships and for the beginning they represented the basement of the safety crew. In time, the contact with other nationalities crew members permitted the knowledge transfer and option to replace them.

Beside these problems of nationality, culture and language differences, can exists onboard problems raised by age differences between crew members, in many cases younger persons have to coordinate and control older and more experienced crew members, situations generated by position and rank. These problems are bigger when we talk about a person on first experience onboard ship and particular in a multinational and multicultural crew.

Due to these facts was compulsory for the maritime training institutions to reflect and change the training concepts in order to facilitate the accommodation inside of a multinational crew, mainly onboard ships with a various cultures crew. One of the solutions proposed included the possibility to cover the requested onboard practice to foreign or multinational shipping companies'.

Trying to find how cadets and younger officers have felt their first contact with the actual onboard environment, a multicultural one, a group of lecturers from our University realized a study about, using for this reason the experiences of our students during their onboard practice.

A MULTICULTURAL CREW – BETWEEN CONCEPT AND REALITY

The multinational crews appear on the shipping market as result of different economical reasons. First of all has the necessity to reduce the costs with personnel, but also to keep the requested standards onboard.

In this way, owners change their crew resource option to work force markets from Asia and Eastern Europe mainly. At beginning they take position onboard as O/S or A/B in deck compartment and as motormen in engine department, after, owners start to accept also deck and engine officers, even at managerial level, as Master, Chief Officer and Chief Engine.

Changing from single nation crew to multination crew has not avoided by problems and difficulties, mostly due to different concepts applied by the owners onboard related to multiculturalism and working relationships. An ideal solution will be to have seafarers' from same nationality in one department and if will be possible to assure the operational officers from the same nation. To satisfy owner certitude that everything is alright onboard and his property is used in good condition, the ship management will be cover by owner's people, same nationality with the owner or very confident owner persons. In present, many companies apply this concept, even better, onboard ship the operational is covered by one nationality crew members and only the ship management is from other, in case of impossibility to be from the same nation.

In addition to different nationalities, multiculturalism can also involve different cultures for the different groups aboard, meaning that the different groups may have different ways of seeing thinks and different ideas about who is the most important aboard. They might for example be the people on the bridge rather than those in the engine room, or the young rather than the older people aboard.

Cultural differences represent the fundamental of communication and involve development of understanding skills between different nationalities. These differences become visible when we get in contact with other nationality persons, a frequent fact onboard of multination crew ship. Peoples see, interpret and evaluate the things around them in very different ways. What seem to be right in one culture can be, for many times, inappropriate for other culture.

Misunderstandings due to cultural differences appear when a person of a nominated culture wants to impose own point of view to another person, from a different culture and with different principles. Wrong interpretation is the main element arise when want to induce to other person our own concepts.

Without a good knowledge of others cultural characteristics is preferable to adopt a diplomatic approach for different aspects which keep by own culture. To became consciences by the own culture dynamics is a difficult task. From our first life days are learned to see and to do some things at an unconscious level. Own experiences, personal values and cultural bases are leading us to do things in a designated way. There are moments when must to pass over our cultural borders to realize the impact of other culture on us. Is very usefully to have answers from different nationalities colleagues and also from different cultures, in order to help us in development the own style regarding to cultural treatment applied to other peoples.

Even cultural similarities can create misunderstandings some times. When consider than other persons have a similar culture with ours, we take the risk of wrong interpretation of our actions, with result in a negative reply from the others.

Is more than sure to suppose the existence of major cultural differences until will find cultural similarities.

There are many references levels which can help to express the cultural differences perception, as:

- Primary level or parochial, when peoples don't know to do different things other than personal way. At this level the impact of cultural differences is ignored.
- Second level or ethnocentric, peoples accept others thinking way, beside of their own, but still considers own style as the most indicated one. At this level the cultural differences are seen as a source of problems and peoples have tendency to ignore or reduce the importance of these.
- Third level or synergistic, person conscience own thinking way and others thing ways and choose the best solution for the present situation. At this level, peoples realize that cultural differences can lead to problems, also to benefits and they are interests to use the cultural diversity for creation of new and alternative solutions.
- Last level or cultural participation, is the stage when persons from different cultures belong together to create a common thinking culture. At this level peoples talking one each other, creates new understandings, new rules to help in solving of a particular situation.

Increasing of the cultural knowledge means to observe the positive and negative aspects possible to appear inside of cultural differences. The cultural diversity can be a source of problems, especially in the fields where is necessary to collaborate and work together. The diversity increases the complexity and confusion level and make more difficult to reach a common sense.

In order to manage well the cultural differences is important in the first time to know and understand them, not to be afraid of.

So long, each of us is the product of his own culture is necessary to increase the self and collateral knowledge. For this objective there is not a book to treat the cultural differences, not exists written rules to be followed in suck kind of situations.

When peoples achieve the necessary cultural knowledge, they realize than:

- we are not the same;
- similarities and differences are both important;
- there are unlimited ways to reach the same goals of living together;
- best solution depend by the particularities, each situation is different and may request different solutions.

A correct approach of the cultural differences can be done through some concepts acceptance, like:

- accept that you don't know;
- judge before;
- be sure to be understood;
- become familiar with ambiguity;
- accept diversity.

These are few concepts regarding the correct deal with cultural differences. Not all of these can be applied onboard ships, but ones can provide good results, mainly when make references to an environment which request a very good collaboration and work relation.

In many cases the cultural differences exists inside of the same nationality and are pass very hardly. When put together more than two nationalities persons, these differences become extremely difficult to be pass and in this situation is necessary to know to manage them and to try to find a middle way if the best solution can't be found.

Also, the cultural behaviour is different from person to person and the approach modalities must to be adequate to each person. Is very important to know from the beginning how to deal with these cultural differences, especially if want to perform a longer carrier inside of a multinational working environment.

CONSTANTA MARITIME UNIVERSITY STUDENTS' ONBOARD PRACTICE

Until 2004 Constanta Maritime University students' practice has develop onboard of scholarship "Neptun", but due to a lot of engine and hull problems this activity has o be suspended.

After suspended of practice onboard scholarship the solution found has to sent our students' in international voyages with different shipping companies, local or international, for this action been contacted the local crewing agencies or owners offices. This was the first step to present situation, when over half of our students cover their requested onboard training on ships of different owners, most of them, international shipping companies with a great rename on the world shipping market, as NYK Ship Management, Japan, Peter Dohle from Germany, Maersk, Denmark, CMA-CGM from France and many others, in totally, 22 shipping companies being part of the partnership.

Taking account of the present regulations regarding onboard training period as cadet, 12 months for deck cadet and 6 months for engine cadets, our University take decision to help and facilitate students' onboard practice. In this way, in the present there are agreements signed between shipping companies', their local representatives and University, where are stipulated the requested training objectives, onboard live and work condition and schedule for students and the level of theoretical knowledge necessary to be acquire by students before to proceed to onboard practice.

Adopting this solution, in time, number of shipping companies' interests to take cadets has increased and the number of students trained has increased also. During the year of 2008 through this protocol a number of 555 students covered their onboard practice on ship owned or under management of collaborative shipping companies.

Inside of this protocol companies have possibility to offer to our students' scholarships during their study years and other facilitations in order to create the own group of future company's officers. In the present are ship owners which select students, through tests and interviews, from the first study years and include them inside of future companies' personnel development program, offering to students monthly scholarships, opportunity to cover the necessary onboard cadets' practice and to be sure on the end study position inside company.

In the same direction, our University, as participant at European Erasmus Programme for students mobility, in partnership with European shipping companies', has get possibility to other 182 students to cover their onboard practice, including an Erasmus scholarship as Erasmus students. After the first months of this project development an increased number of students have became interested in this possibility, the advantage being represents by the cumulative amount between scholarship and cadet monthly payment.

For the future, we are interested to increase the number of partner shipping companies' and also to extend the Erasmus programme in order to offer to more students the possibility to have the necessary cadets period at the end of study years and to make possible participation to officer certification exams after their graduation.

STUDENTS' BEHAVIOUR INSIDE OF A MULTINATIONAL CREW

Starting from the present situation, when the world fleet is based on multinational and multicultural crews, and taking in consideration that our students make their onboard training on ships of international owners, a group of lecturers from our University have the initiative to realize a study about what are the students apprehensions and considerations regarding the first voyage or voyages onboard ships' with multinational crews. This initiative has raised after a number of bad feedbacks from students' very disappointed by the first cadet voyage and who intend to give up to a maritime career after finishing their academic studies.

To do the study has adopted the questionnaire and direct discussions techniques, involving in this action students' from different faculties, in connection with maritime carrier, just arrived home from a cadet voyage.

The questionnaire has based on a set of questions about company where they made the voyage, crew structure by nationalities, social life and working activities onboard, type of relationships developed onboard with the others crew members, what nationalities and cultures they consider to be closer to own culture, if they have difficulties to socialize onboard, how long period consider necessary to achieve skills in order to understand other cultures and what are the opinions about the direction of their future maritime careers.

Analyzing questionnaire answers we were able to open a free discussion with students' and to try to find the motivations for different answers. During discussions most difficult has to made students to speech freely about their experience during onboard stage or stages and to pass over the fact that they are talked with a teacher.

Answer analyze allowed to have a percentage view about students' opinions and the results showed that they are more compatible with European countries seafarers', have more possibilities to develop social and work relations with these and accept more easily orders and instructions from European officers and Masters. Part of them acknowledges that they interact without problems with Asian seafarers also. Most difficult was to collaborate with superior officers or nominated onboard training officer when they are from an Asian culture. Some difficulties have noted in relations with Eastern European officers, but these were produced due to different personal opinions, not professional.

A very important point found in almost all questionnaires studies was about difficulties in communication with other crew members, part because of poor English language knowledge, part because the English was talked with native language spelling influence and many words were difficult to be understands. Starting from the language problems, number of students' avoided to socialize with some of the crew members and maintained a strictly professional relationship.

Period considered as minimum necessary to accommodate and start to interact with other nationalities crew members onboard has varied from one week to one month, more accessible on ships with a strong cadet training programme developed. Longer has considered being the accommodation period to daily duties and to the training schedule, some students' taking the give up decision due to their forbearance about possibility to reach the conditions requested for duty onboard.

For many students' had difficult to express an opinion or a point of view about cultural similarities or differences with other nationalities didn't have enough knowledge about these matters, but talked about what they felt in relation with other nationality crew members considered as to be cultural correspondences or differences. They found many common aspects with persons from all over the world, especially about the free time spending or passions for sport activities and events, about musical preferences and in many cases these represented the starting point in a future personal and friendly relationship. Differences related were based, as expected, on religious problems or native social life characteristics, most of them in relation with Asian or African seafarers met onboard.

As a general opinion, problems arise from the nationality and cultural differences have considered possible to be pass if there is interest to develop a long and nice career in the maritime industry, especially onboard ships. An interest opinion has obtained from part of questioned students', who considered that problems and misunderstandings can appear every time and in every working environment. They acknowledge that onboard environment is a particular one, with restrictions imposed by the space and activity characteristics, but the attraction for this job, a not easy one, but with many satisfactions, can lead to a personal approach more open to understanding and acceptance of the other nationality cultures and particularities.

On the other way, students' who express their option to give up to an onboard career, wants to perform in a relative activity field, where they have possibility to put in practice knowledge's acquired during the study years.

CONCLUSIONS

Have to accept presence of multicultural crews' onboard ships. Also, the idea of correspondences and differences between cultures has to be accept and in this direction to know to understand and manage the cultural relations. From the beginning will be better to understand that differences are more visible than similarities and to try to pass over the first and to reach the seconds. When we talk about multiculturalism is important to realize as obviously the differences between concepts and reality and to learn to treat correctly each culture, as a unique entity, not to apply the same format to all contacted cultures.

The multicultural problems are harder to be managing at the first contact and here we refer to younger maritime cadets and officers, persons who can be very affected by difficult relation with other nationality persons. A solution can be represented by the involvement of the training institutions in preparing of the younger cadets for a multicultural work environment. Before their first experience onboard ships a special training about multicultural concepts and social activities in a multicultural crew can be welcome in order to offer the necessary knowledge's about and how to deal with problems coming from cultural differences. For this reason is absolutely necessary to know what deficiencies have met the previous students' onboard and to create a training programme based on these.

Our University lecturers study represent the staring point for more other studies on the same or additional subjects, offering an image about the actual students' position regarding the training activity onboard of a multinational ship. The present study shows that more than half of students' who made their first voyage are not afraid by the idea to work in a multicultural environment, considering more interesting the opportunity to know and interact with other cultures. Students' who considered as almost impossible to perform onboard of a multinational ship, take in consideration the capacity to work with persons from other cultures in a different activity field.

Maybe, our study will not reduce the number of students' who wants to give up to a maritime career, but helps us to understand better what problems are meet onboard and in this way to be able to offer solutions to be pass over.

References

[1] Arsenie P. Ship Management and Administration, Nautica Publisher, 2007, 156 – 170.

[2] Anechitoaie C., Surugiu F. Maritime Organizations and Conventions, Nautica Publisher, 2008, 71 – 75.

[3] Constanta Maritime University Presentation, from www.cmu-edu.eu, 2009.

[4] European Union – DG VII, MARCOM Project: The Impact of Multicultural and Multilingual Crews on Maritime Communication, Final Report, Volume 1, Transport RTD Program, 1999.

[5] Horch, J. An Analysis of Decision-Making Processes in Multicultural Maritime Scenarios, Maritime Policy and Management, No. 31, 2004, 15 – 29.

[6] International Maritime Organization, MSC 83/12/4, Training and Watchkeeping – Need for 'Trainee' berths on board ships, 30 July 2007.

[7] International Maritime Organization, STW 39/7/3, Comprehensive Review of the STCW Convention and the STCW Code – Communication and leadership skills, 31 October 2007

[8] Stephanie Q., Giovanna C. What is Cultural Awarness, anyway? How do I build it?, 2005, from www.culturosity.com, 2008.

MANOEUVRING PREDICTION DISPLAY FOR EFFECTIVE SHIP OPERATION ON-BOARD SHIPS AND FOR TRAINING IN SHIP HANDLING SIMULATORS

Knud Benedict,
Prof. Dr.
Michael Baldauf,
Sandro Fischer,
Michael Gluch,
Matthias Kirchhoff,
Hochschule Wismar, University of Applied Sciences-Technology, Business and Design,
Dept. of Maritime Studies / Maritime Simulation Centre Warnemuende / Germany)
E-mail: knud.benedict@hs-wismar.de

Abstract. A new prediction tool was developed to simulate the ships motion with complex dynamic models in fast time and to display the ships track immediately on ECDIS for the intended or actual rudder or engine manoeuvre. These simulations are based on input from the ships actual sensors via the Voyage Data Recorder and furthermore from diagnosis tools analysing the status of the manoeuvring facilities and providing information in case of failures, e.g. reduced engine power or larger rudder response time due to malfunctions of the equipment.

Within this paper investigations into the feasibility and user acceptance of the new layout of navigation display will be introduced and selected results of simulation studies testing the influence on manoeuvre performance dependent on different kind of prediction functions will be discussed. This Dynamic Prediction Display is intended be used on board of real ships but is also an effective tool for training in ship handling simulators because the trainee can immediately see the result of the actual rudder, engine or thruster commands, even before the ship has changed her motion. Examples will be given for results from test trials in the full mission ship handling simulator of the Maritime Simulation Centre Warnemuende.

1. INTRODUCTION – STATE OF THE ART AND NEW APPROACH

The role of computer based simulation is increasing on the ships bridge, especially for manoeuvre planning and for collision avoidance. Prediction tools are very helpful and already in use on ships for a long time. Well known is the so called Trial Manoeuvre mode in ARPA radars to be used in order to analyse future encounter situation for selected relevant course and speed alternatives to deck potential collision avoidance strategies.

With the emerging Electronics Chart and Information Systems ECDIS new tools were introduced for supporting voyage planning by means of manoeuvring characteristics as in

Fig. 1. For controlling the ship on her route the future track of the ship was shown as a so called "curved headline" overlay in ECDIS.

However, theses prediction are very simple only based either on new constant course and speed values as in the ARPA trial function or on estimated future courses & tracks based on the simple integration of the current ship motion parameters as rate of turn and speed components to be considered as constant.

The simplification of these predictions allows restricted use only. Therefore new concepts for on board displays and simulation tools were developed including the immediate response on changes of rudder and engine commands as drafted in Fig. 2.

This approach was investigated in research projects, dedicated on the one hand to the further development of user interfaces on ships navigational bridges and to investigations into potential improvements for manoeuvring assistance on the other hand. A prediction tool was developed to simulate the ships motion with complex dynamic models in fast time and to display the ships track immediately for the intended or actual rudder or engine manoeuvre (Benedict [5]).

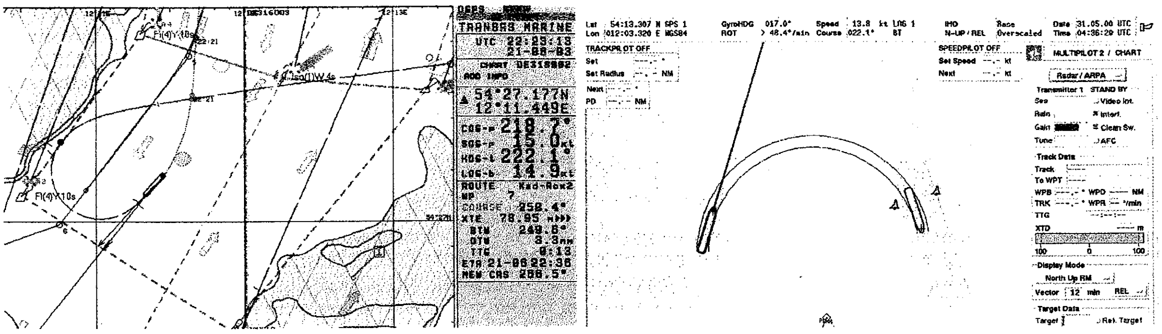


Fig. 1. "Path Prediction" for turning manoeuvres based on simplified motion models (TRANSAS-ECDIS, left) and "Curved headline" prediction calculating the ships track on the basis of integration taking the current motion parameters as constant (SAM-NACOS, right)

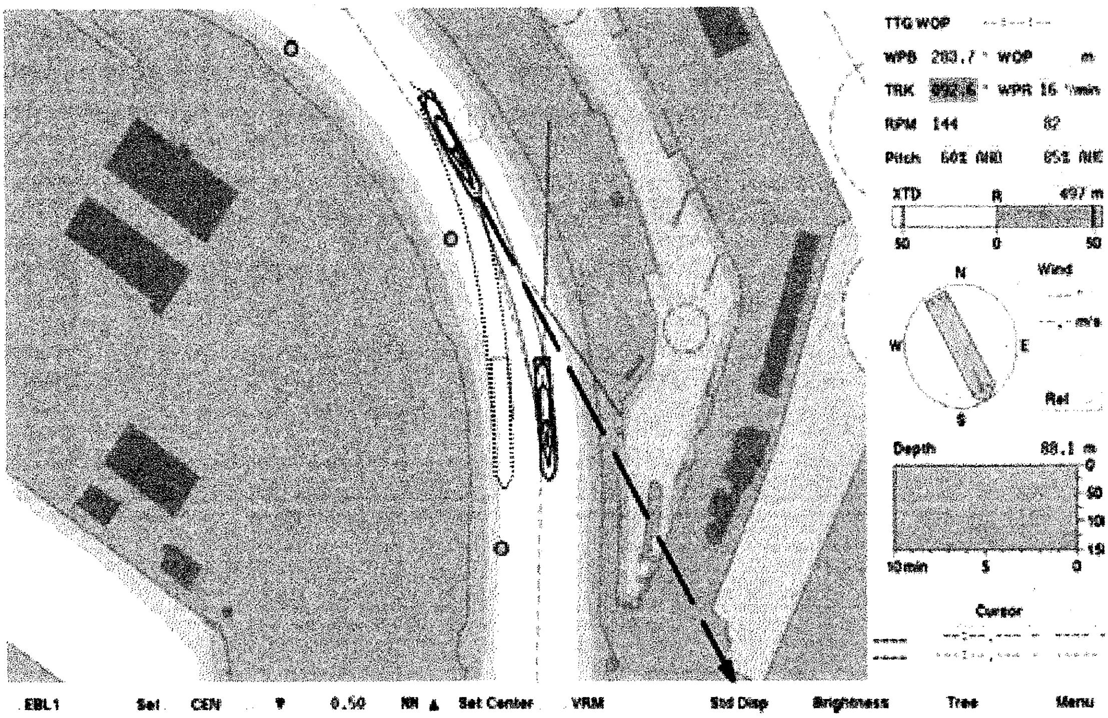


Fig. 2. New concept of an "On-line- Manoeuvring- Assistant: Simulated track predictions (red contour / broken lines to STB) of steering characteristics according to the current steering handle position /rudder angle as ECDIS overlay compared to conventional prediction (black contour / solid lines close to ahead vector)

Generally there are two areas of application of such a prediction tool. It can be seen both as training tool for ship manoeuvres and to be used as assistance tool on board vessels:

Training Tool: The prediction of ships motion as an immediate response could be an excellent method to demonstrate the results of changes or alternatives of using manoeuvring control devices as for instance propellers, rudders or thrusters. This is of increasing importance specifically for the growing complexity of manoeuvring control systems starting from simple one-propeller and middle rudder, via twin propellers with double rudder up to new azimuth propellers which can be turned by 360° (there are ships with even four of these sophisticated thrusters).

Assistance Tools: Predictions as elements of on board displays can be used as in the loop control elements to steer the ship manually but supported by the future track or speed indication in the ECDIS interface.

One crucial problem for the prediction is the accuracy of the simulation. In the mentioned projects a very sophisticated approach was used to represent the ships' dynamic by very extensive equations very similar to those used in Full Mission ship handling simulators. The parameters of the equation of motion will be estimated by an extra fast time simulation program and a data analyser already used for tuning of the hydrodynamic models in the ship handling simulator.

These methods will be described in the following chapters and examples will be given for results from test trials in the full mission ship handling simulator of the Maritime Simulation Centre Warnemuende (http://www.sf.hs-wismar.de) upgraded in 2007/2008.

The Maritime Simulation Centre Warnemuende at Wismar University, Department of Maritime Studies in Rostock-Warnemuende accommodates six simulators embracing a common network and comprised of four ship-handling bridge systems with differing levels of equipment, a ship's engine system and a VTS simulation facility. The interaction of many of the single simulators is one of the unique features of the MSCW: they can be interfaced to form a big scenario comprising all simulators and connecting e.g. the big bridge 1 with the full mission engine simulator. The Ship handling Simulator (SHS) is located on the first and second floors of the centre. It comprises four bridges: Bridge 1 consists of a fully integrated replica bridge assembly projector-based 360° visual display, Bridge 2 has a similar 257° visual display system which can be specifically used for manoeuvring a ship from bridge wing, the remaining two bridges 3 and 4 are used mainly as radar cabins, each being additionally equipped with 120° visual display screens. A lab with eight stations for computer-based Instructorless Training (ILT) completes the setup for effective ship handling training. They can be also interfaced into the complex scenario as own ships.

2. APPROACH FOR PREDICTION TOOL WITH FULL SIMULATION MODELS

2.1. Ship dynamic model and Technological setup for simulation

The following equation of motion was used as math model for the ships dynamic:

$$\begin{aligned} X &= m\left(\dot{u} - rv - x_G r^2\right), \\ Y &= m\left(\dot{v} + ru + x_G \dot{r}\right), \\ N &= I_z \dot{r} + m x_G\left(\dot{v} + ru\right). \end{aligned} \tag{1}$$

On the right side are the effects of inertia where u and v represent the speed components in longitudinal and transverse direction x and y, r is the rate of turn of the ship. The ships mass is m and x_G is the distance of centre of gravity from the origin of the co-ordinate system, I_z is the moment of inertia around the z-axis.

The ships hull forces X and Y as well as the yawing moment N around the z-axis are on the left side. Their dimensionless coefficients are normally represented by polynomials based on dimensionless parameters, for instance in the equation for transverse force Y and yaw moment N given as the sum of terms with linear components N_r, N_v, Y_r and Y_v and additional non-linear terms depending on speed components u, v, rate of turn r, revolution n and rudder angle δ. Other forces as for instance rudder forces and wind forces are expressed as look up tables. There are additional equations for the engine model, additionally with look-up tables to represent automation systems characteristics.

The solution of this set of differential equations is calculated every second; some internal calculations are even done with higher frequency.

This equation of motion (1) can be written in the form:

$$x'(t) = f(x, u_c, t). \tag{2}$$

Where:

– State spaces with track co-ordinates ζ-η, heading ψ:

$$x = [u, v, r, \xi, \eta, \psi, \delta, n_{ME}, n_{TH}, ...];$$

– Controls with commanded values *Cmd* for main engine ME and thrusters TH:

$$u_c = [\delta_{Cmd}, n_{ME\_Cmd}, n_{TH\_Cmd}, ...];$$

– With initial conditions at: $t = t_0: \; x(t_0) = x_0, \quad u(t_0) = u_{c0}$:

$$x_0 = [u_0, v_0, r_0, \xi_0, \eta_0, \psi_0, \delta_0, n_{ME0}, n_{TH0} ...],$$
$$u_{c0} = [\delta_{Cmd0}, n_{ME\_Cmd0}, n_{TH\_Cmd0}, ...].$$

This equation of motion (2) can be solved by numerical integration for the prediction time period t_0 to $t_1$in the form of the general solution:

$$x(t) = x(t_0) + \int_{t_0}^{t_1} x'(t)\, dt,$$

i.e. for the full set of states and controls:

$$x(t) = x_0 + \int_{t_0}^{t_1} f(x, u_c, t)\, dt. \qquad (3)$$

A simplified solution for a simplified predictor is used by integration of track and heading assuming constant speed u0, v0 and rate of turn r0, which results always in a circular motion with constant speed:

$$x(t) = x_0 + \int_{t_0}^{t_1} f(u_0, v_0, r_0)\, dt. \qquad (4)$$

The Input output relations are shown in Fig. 3. The inputs consist of controls, the states and the data for the environmental conditions in the three blocks on the left side. The core module Simulation/Prediction is in the centre of the figure. Additionally there is an input of the Ships condition parameters. They are normally fixed but in case of malfunctions they might change, e.g. reducing the rudder turning rate or maximum angle. The results from the Simulation block are transferred to be displayed in ECDIS or Radar.

In that figure also the more technological setup of the structure of modules is described. A commercial IMO-proven Voyage Data Recorder (VDR) plays the role of data collector for the controls, states and environmental parameters measured by the ship sensors. After pre-processing these data they will be stored in Shared Memory 1, together with the condition parameters which will be provided by a diagnosis system. This system continuously checks the ships and engine conditions.

From this memory the data are available for other modules:

The Simulation Prediction Module uses the data from Shared Memory 1 to predict the ships track and speed for a certain time period, e.g. 10 minutes. The results are sent to Shared Memory 2. The Presentation Module uses the data both to display the actual position and from Shared Memory 2 to display the future track. The Prediction parameters are controlled by a user interface integrated in the Presentation module with regard to predicting cycle and length of track. Additionally a new simulation component was added for simulating predefined or full flexible manoeuvres.

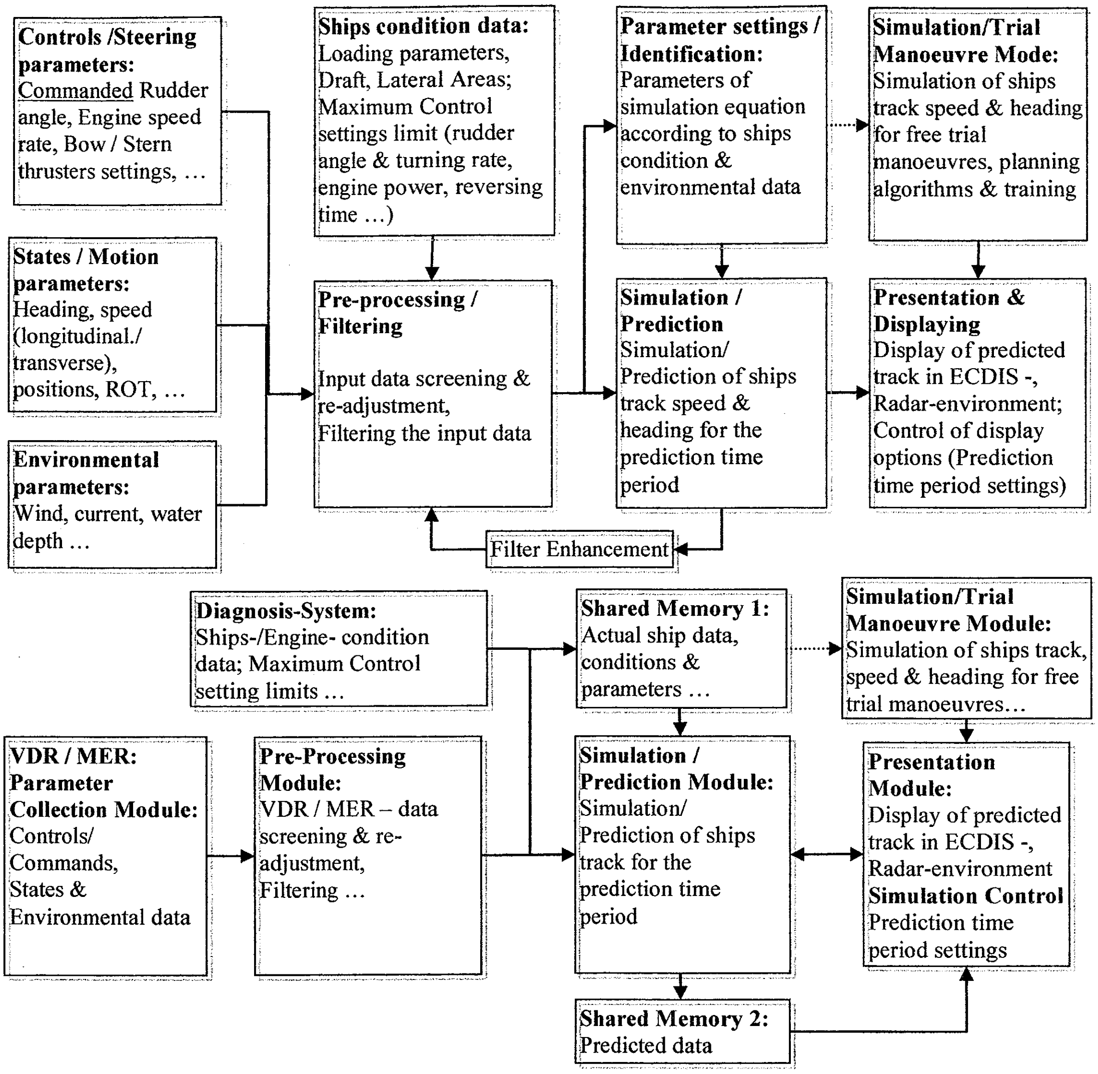


Fig. 3. Input / Output Concept for prediction processes and data flow (top) and Modules & data sources and sinks (bottom)

2.2. Presentation of dynamic Predictions in ECDIS environment

For a compact presentation of information to the captain, pilot and responsible navigating officer respectively a new layout of a conning display was designed and implemented into the equipment installed on an integrated navigation system. In Fig. 4 the layout of the prediction display in an ECDIS is shown. The display layout contains an overlay of ECDIS and CONNING information together with the prediction.

In the centre the ECDIS information in Head up Mode together with motion parameter for longitudinal speed (10.1kn and transverse speed (0.1 kn) as well as a circle segment with the rate of turn to STB (4.0 °/min) is shown. The ships position is displayed in the centre of the ECDIS as ships contour where the track prediction can be indicated as curved track or as chain of contours for the selected prediction time. The prediction parameters as range or interval of presentation can be set in the control window at the right side.

The predicted track for the simplified prediction is shown as red curve: According to the actual/present rate of turn to starboard the conventionally predicted track is presented as a circle segment to the right side as track for the time range of 5 min with a speed of 10.1 kn.

The dynamic prediction with the full simulation model is shown as blue curve. This dynamic prediction reflects the setting of rudder and propeller parameters shown in the left bottom window: The two rudders of the ferry used in this example are set to 14° Port and the Engine Order Telegraph for the two controllable pitch propellers are set to 100 % representing 159.8 rpm of the propeller. The actual pitch status is 53 and 54 respectively. This interface allows for a presentation of dynamic predictions of steering and stopping characteristics as an immediate response according to the current steering handle or engine order telegraph position.

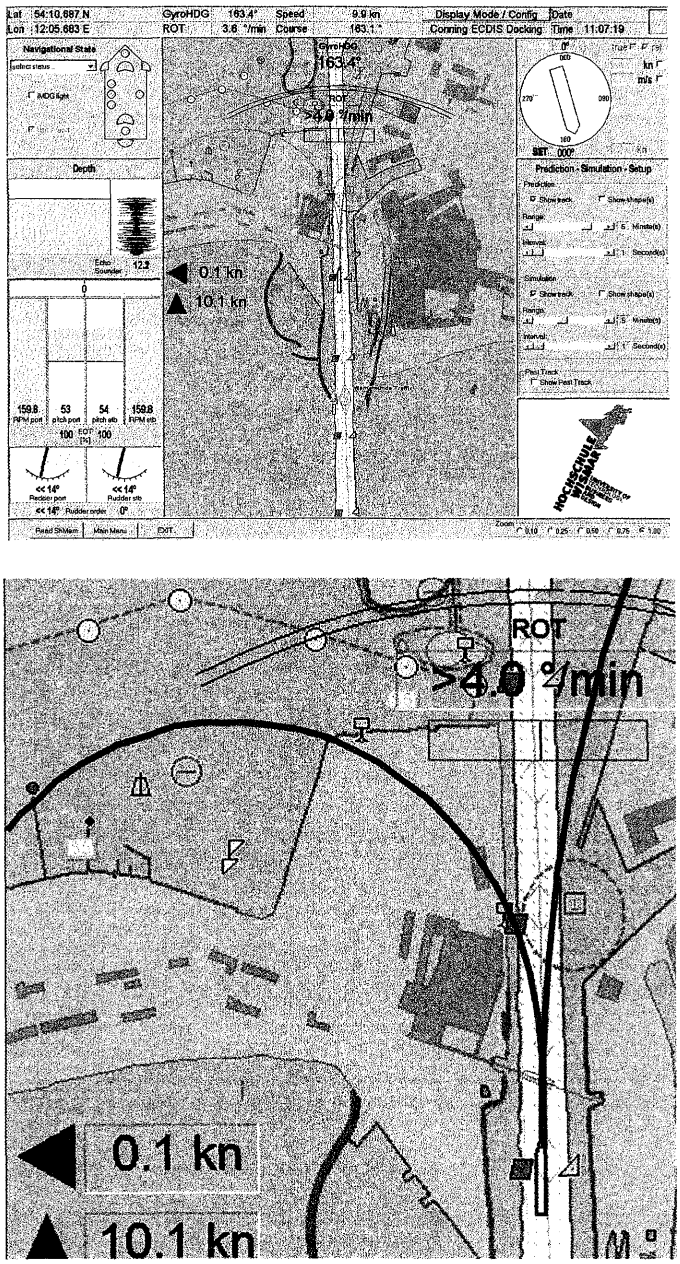


Fig. 4. Layout concept for Manoeuvring Prediction in ECDIS (left); Presentation of different track predictions (right) for rudder manoeuvres: a) Simplified prediction from integration Eq. (4) of current constant motion parameters (magenta track with small turning to STB) and b) Sophisticated dynamic prediction based on full math model Eq. (3) considering the change of rudder angle (too large!) to PT (blue track with turning to PT)

3. APPLICATION OF THE NEW DISPLAY FUNCTION IN SHIPHANDLING SIMULATOR AND SELECTED RESULTS OF TEST TRIALS

3.1. Test set up and scenario

For the purpose of testing the technical feasibility and user acceptance the new conning display with integrated prediction functions was implemented in the INS equipment of the large full mission simulator bridge of the Shiphandling simulator of MSCW. In Fig. 6 the bridge layout is shown for the experimental setup with the manoeuvring controls on the console in the foreground and the ECDIS / CONNING display on a separate display in the background.

The sample ship is the RO-PAX Ferry "Mecklenburg-Vorpommern" with Loa = 200m, Boa = 28,95 m, Draft = 6.2 m, Displacement = 22720 t and Speed = 22 kn. She has two pitch propellers and two rudders located behind the propellers and additionally one bow thruster.

Several test scenarios were developed and used for trials with ship officers and masters during test trials. One sample scenario is given in Fig. 6: the test area is the port entrance to Rostock Sea Port. A Ro-Pax-ferry is entering the port to be steered through the fairway and to be berthed in the dedicated basin. Before berthing the officer on watch has to turn the ferry in the turning area and to go astern to the berth.

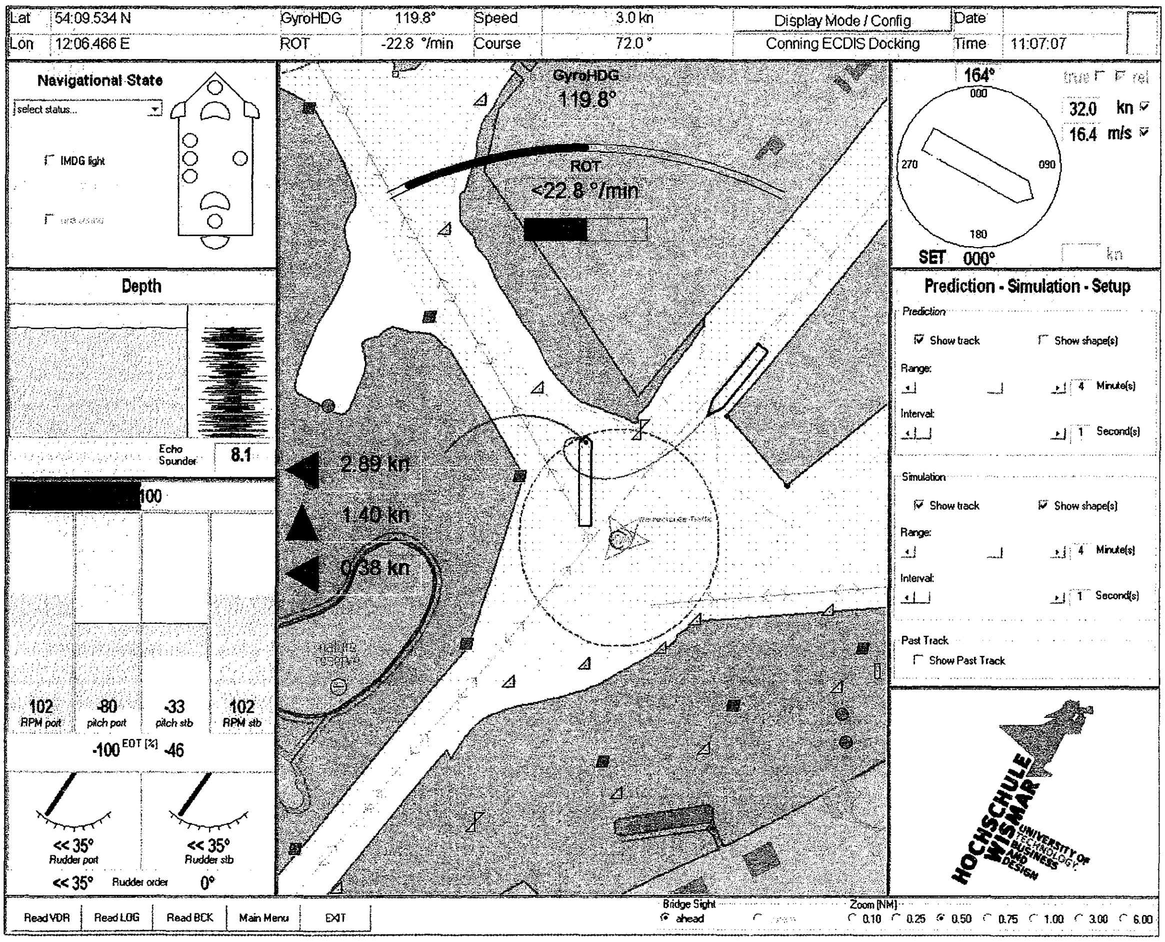


Fig. 5. Comparison of methods based on Different track predictions considering full rudder angle to PT and full astern: Simplified prediction from integration Eq. (4) of current constant motion parameters (left track, result from current PT turning of bow) and Sophisticated dynamic prediction Eq. (3) based on full math model (right track going astern and turning into harbour basin)

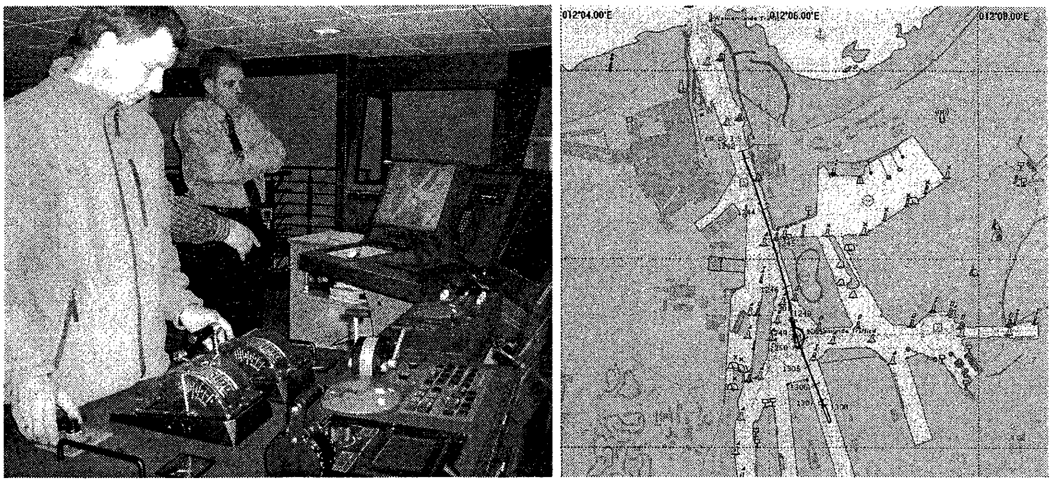


Fig. 6. Test setup for new Conning / ECDIS Display on Bridge 1 in Shiphandling Simulator during Test trials for new Prediction Display: Test area is sea port of Rostock in ECDIS presentation with scenario track of approach, turning manoeuvre and astern motion into ferry basin

3.2. Result of tests and discussion

The following series of figures will indicate the effect of the dynamic predictor and its advantage compared to the simplified look-ahead predictor. Whereas Fig. 4 showed the start of the scenario run in the fairway entrance Fig. 7 presents the predicted contours during the stopping manoeuvre at the turning area: It is clearly to be seen that the dynamic predictor allows the estimation of the stopping distance and even the consequence of going astern if the engine will be kept in reversed operation too long. In contrary the simplified predictor indicate a nearly straight motion with the constant speed at the beginning of the manoeuvre. After turning the ship by means of the bow thrusters the ship will be moved in astern direction into the harbour basin for berthing the vessel as can be seen from Fig. 8.

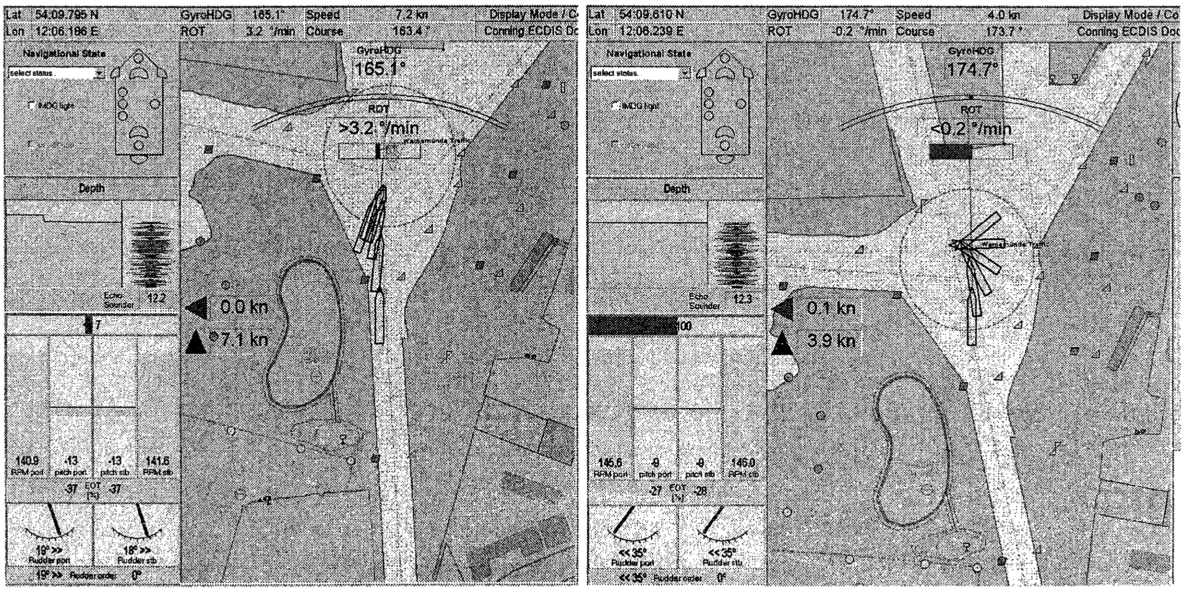


Fig. 7. Stopping manoeuvre at the turning area:

– predicted contours show the stopping distance and even the consequence of going astern if the engine will kept reversed operation too long (left), and

– Turning manoeuvre at the turning area: the ship is using rudders and bow thruster (right)

The user acceptance was assessed by using guided interviews and structured questionnaires. The first series of simulation trials were performed by eight experienced navigating officers and captains. The range of time at sea was between 5 years minimum and 25 years. Each participant started with an entry questioning and acted as captain after briefing. The bridge team was completed by a helmsman familiar with the manoeuvring facilities of the simulated ferry.

The most important result was that each participating navigator has reached the final goal without a crash already during his first trial. This is of special importance, because only one of the participants has practical experience with the ship used for the simulation study.

Although there are only results available from the series of the pilot trials some tendencies can be recognised: The overall assessment of the new Conning Display layout was ranked by the participants between minimum 6 and maximum 9 on a scale from 0 (worse, no enhancement) to 10 (excellent, practical and real assistance for my work). All participants summarised, that the fusion of conning information in combination with ECIDS is a new quality compared to conventional display layouts. The dynamic prediction was assessed as significant valuable element especially when only few or no experience is available in handling and manoeuvres the relevant ship or in harsh environmental conditions (Benedict [1], Baldauf [2]).

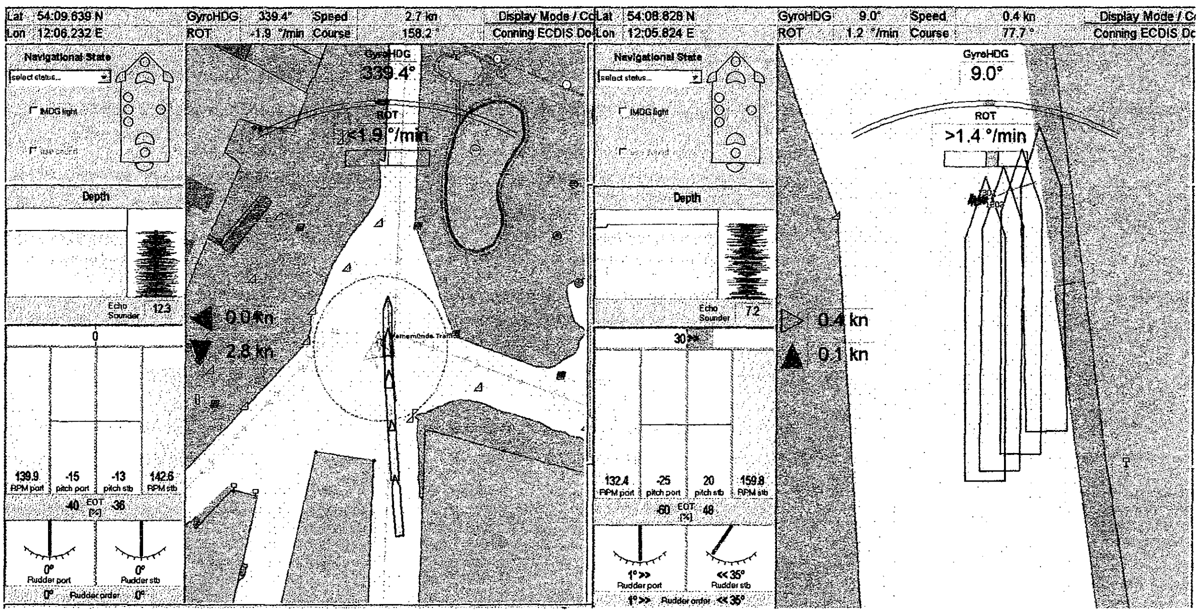


Fig. 8. Final phase of scenario: the ship is entering the basin for berthing (left) and is crabbing alongside the jetty (right)

4. PROVISION OF SHIP MODEL DATA FOR THE DYNAMIC PREDICTOR AND PARAMETER TUNING

4.1. Modelling of ships dynamic by means of fast time simulation tools

The quality of the math model for the simulation and the parameters in the equations are of high importance for the effectiveness of the dynamic prediction. There is a great need for fast and effective modelling / tuning processes not only for the predictor but also in Ship handling simulators where clients from shipping companies need to be trained on their ship types. This is the same procedure as we need for tuning the ship model parameters in the predictor.

If this modelling process is done manually by conventional tuning methods in the real Ship Handling Simulator (SHS) then there is high time consumption for this processes, up to one month or longer, because manoeuvre simulation is done in real time; even by using the simulator in "fast mode" – which is up to ten times faster – it is still to slow. Commonly there are no effective tools for supporting the modelling process, e.g. graphical comparison with analysis options. Moreover using the simulator for tuning of models generally means expensive occupation of simulator resources.

In order to avoid these problems PC-based simulation software was developed at MSCW with the same ships dynamic capabilities as the Ship Handling Simulator SHS (Benedict [5]) now to be used for the prediction tool. The Advantage and Capabilities of this software is: The Math Model reveals same simulation results as SHS, it is remarkably faster than real time simulation, the ratio is up to 1/100, the steering of simulator vessels is done by specific manoeuvre-control settings / commands for standard procedures and individual manoeuvres dedicated for tuning purposes.

4.2. SIMOPT & SIMDAT - tools for ship simulation model tuning

Fig. 9 show some details of the SIMOPT interface: The ships main data are displayed in the left part. The hull coefficients are displayed in the centre. Manoeuvres can be selected from the right top menu.

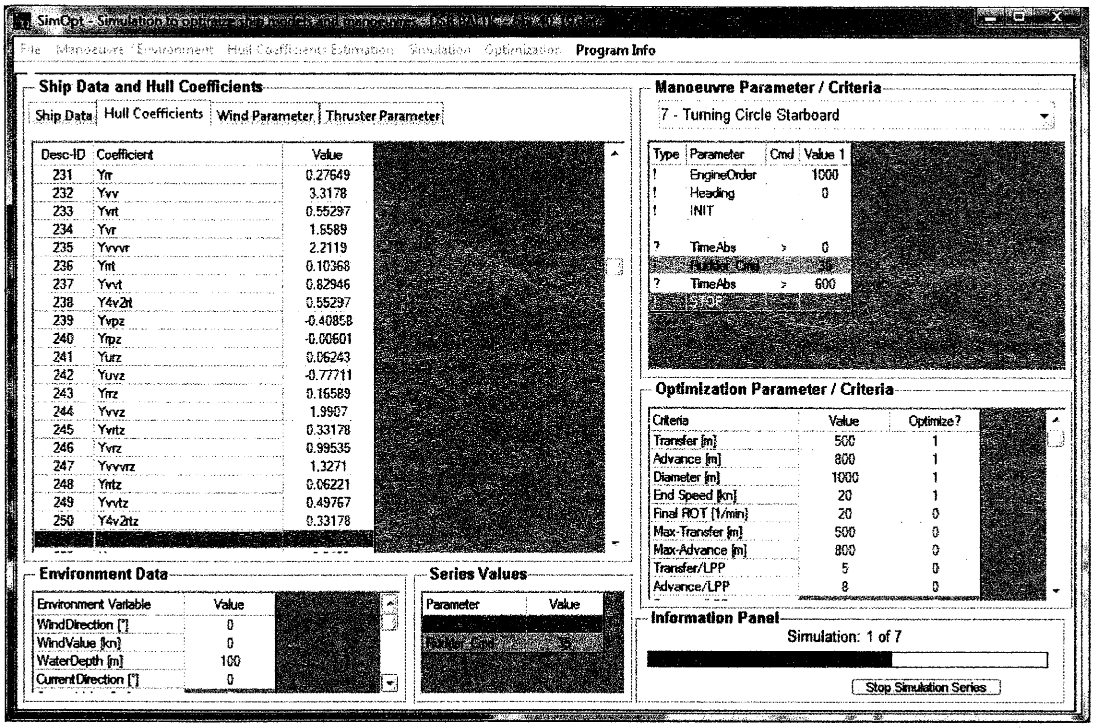


Fig. 9. SIMOPT Interface Elements – Overview: Ship Data (left) / Hull Coefficients, Manoeuvre Commands (top right) as well as Manoeuvre Optimisation criteria and Parameter series values

Several options can be chosen from the top menu in order to calculate the hull data and other parameters e.g. based on methods published in e.g. Oltmann [3], Clarke [6].

Manoeuvres can be selected from the right top menu. Simulations can be done either as single run or as simulation series for selection of up to 3 Parameter series to be simulated in parallel or sequential for:

– Simulation parameters, e.g. Manoeuvre series;
– Ship Parameters (L, B, T, or others);
– Hull / force parameters coefficient and
– Environmental data, e.g. wind force.

A specific new "Offline assessment tool" SIMDAT was originally designed at the MSCW to supply the instructor with semiautomatic assessment of the recorded exercise data in ship handling simulator (Benedict [4]). For the purpose of ships model parameter tuning and optimisation of manoeuvres this

SIMDAT tool was extended: The Data for the manoeuvring characteristics can now be automatically retrieved for all manoeuvres used for simulator ships tuning; enhanced Graphic tools are available for displaying various types of results.

The results of a particular evaluation are shown in Fig. 10. Additionally to the different graphical presentations specific overviews on the results are provided when series of manoeuvres have been simulated. This figure shows e.g. a comparison of simulation series results for turning circle with respect to Transfer, Advance, and Diameter. It can be presented in tables or in diagrams or used for optimization algorithms.

4.3. Sample of a Parameter – Optimisation series for a Ship model

The objective of the parameter optimisation or tuning process is to find suitable ship model parameter files which can be used in the simulator or in the predictor on-board to represent the real ships dynamic.

Starting from the ships main data a basic ship data file will be generated using simple methods e.g. Clarke estimation to have a first estimation of the dynamic behaviour. By means of the SIMOPT program the fast time simulation produces various results of manoeuvring characteristics which are retrieved by SIMDAT and compared with the manoeuvring characteristics of the real vessel. By adjusting the Model-Parameters the manoeuvring performance of Simulator Ship Model is improved. The final goal is to achieve an Optimised Ship Model-Parameter file which has to be applicable as ship model file for the dynamic predictor on the bridge of a ship. The biggest problem is that there are up to 200 parameters and the effect of the changes are not very clear; some changes may even have effects which counteracts the results of the others. Therefore it is very important to know about those parameters which have a clear impact on the manoeuvring characteristics.

One example is given to indicate the effect of tuning of one hull parameter; here the variation of ships moment of inertia I_z is given in Fig. 10.

For the demonstration a Parameter-Series of turning circles with Hard Rudder to Starboard was simulated varying the value of the factor kzz² which was initially 0.16 between 0.1 and 0.2 in steps of 0.01. During the simulation process the status of the execution is shown by means of coloured bars in the relevant data windows.

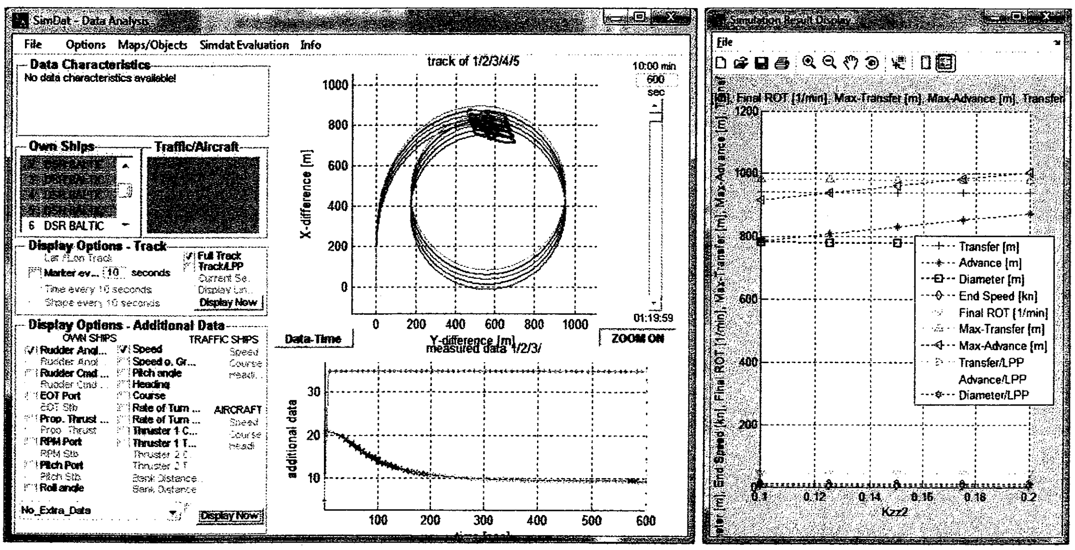


Fig. 10. Model tuning – Parameter series for changing Moment of Inertia for Turning circle tracks and speed plots (left); extract of characteristic manoeuvring data for turning circle in table format (right)

The result in Fig. 10 shows a clear effect on the advance of the turning circle whereas the diameter and the speed loss did not change. The optimization window shows parameters which can be set as target values for the optimization process.

5. CURRENT STATUS & OUTLOOK

5.1. Estimation the ship model parameters

The tuning of the ship parameter files from integrated data as Transfer, Advance, and Diameter used above will be supported by optimization methods in future.

In parallel there is an ongoing project to use Parameter estimation technologies for ship dynamic models from time history data sets (Project MULTIMAR).

For these purposes also test trials in real environment are intended. This will be an opportunity to make use of the new infrastructure given in the "Research Port Rostock" fully in operation since end of 2008. The installation of the infrastructure will serve as a GALILEO Satellite test bed and will provide e.g. pseudo-signals as a unique potential for maritime applications in the real port area of Rostock (Fig. 11).

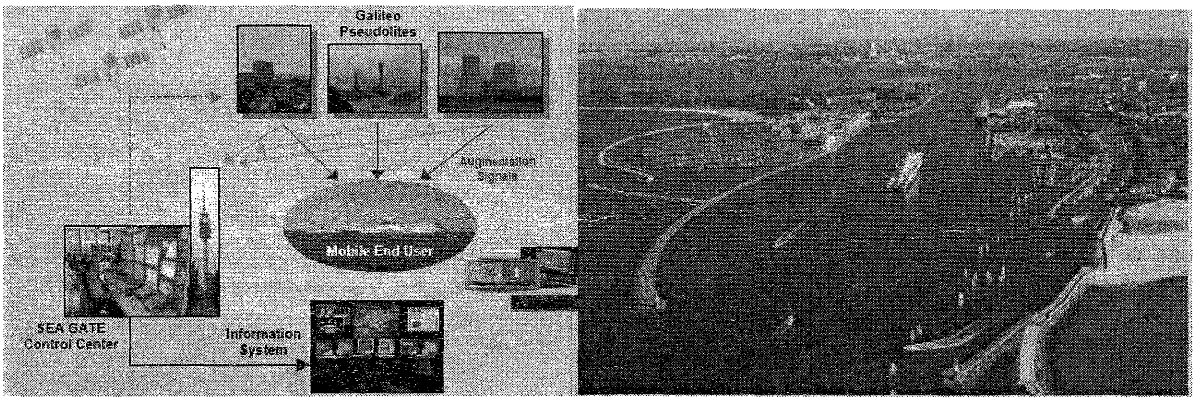


Fig. 11. GALILEO Infrastructure in research port Rostock: Setup of GALILEO pseudolites for simulation satellite communication as augmented test environment for users in maritime transport and cargo handling (based on research project SEAGATE by EADS / RST and DLR)

5.2. Extending the area of application for the prediction / simulation technology

The application of the predictor is currently extended in the ship handling simulator SHS of MSCW: It has proven some benefits for education and training because it enables the simulator instructor to immediately demonstrate complex manoeuvres in training sessions which needs less time in comparison to real time simulation.

Investigations for improving manoeuvres in ferry operation in the port of Rostock were made to analyse the performance specifically in the turning area. Analysing the VDR recordings from ferry approaches it was found that there is some space for improvements. Applying the predictor new strategies were found to save some minutes in this area which is very important in tight time schedules (Fehling [7]).

A new approach is under development trying a series of simulated manoeuvres to reach the final destination Fig. 13. Based on fast time simulation search methods are used to bring the ship into a harbour basin D by generating and evaluating sequences of elementary manoeuvres to find the optimal rudder and engine manoeuvres (Fischer [8]).

The simulation technology is also used to enhance Collision-Avoidance-Display in radar presentation Fig. 13 assisting for collision support by means of calculation of Risk based coloured areas (Baldauf [1]). This approach is using manoeuvring data of the ship which can be adjusted by simulation to actual manoeuvring capabilities of the Own Ship.

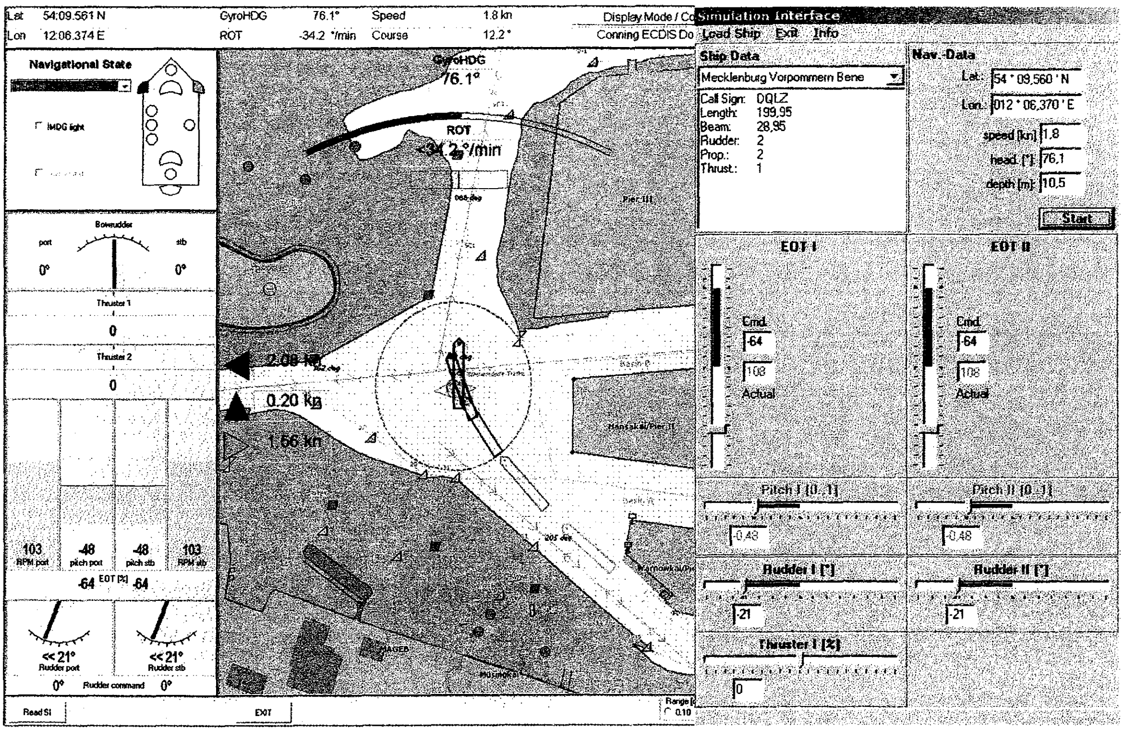


Fig. 12. Interface for Simulation / Trial mode based on manual input for simulated manoeuvres via the steering control panel on right sight of display for Manoeuvring Planning and training

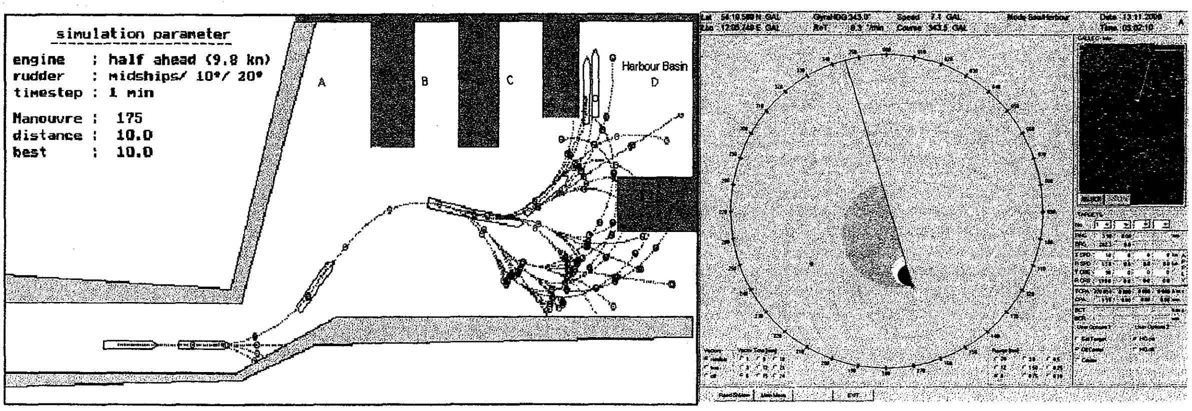


Fig. 13. Manoeuvring Planning methods based on search methods using simulated manoeuvring sequences (left) and Collision-Avoidance-Display in radar presentation (right) assisting for collision support with new approach for Risk based coloured areas using Manoeuvring Data Related to actual manoeuvring capabilities of the Own Ship

6. CONCLUSIONS & ACKNOWLEDGEMENTS

A concept for a prediction tool was designed and a prototype software module for an On-line Manoeuvring Assistance was developed based on a dynamic prediction tool using advanced simulation technology on board of ships. The results of rudder and engine control changes will be immediately displayed in an Electronic chart environment to be used for manual correcting steering actions. It was tested using the Maritime Simulation Centre Warnemuende. During the test trials several manoeuvring situations were managed with an increased performance when using the prediction tool.

The parameters for the ship model equations can be found using fast simulation techniques in the same way as for the tuning of ship models for the ship handling simulator. For the future it is planned to use optimization technology and parameter estimation technologies for ship dynamic model parameters.

The research results presented in this paper were partly achieved in research projects "Condition-based navigational displays" (ZUMANZ), "Safe passing distances of ships" (SIPAS) and "Identification of multi variable parameter models for ship motion and control" (MULTIMAR) funded by the German Federal Ministry of Economics and Technology (BMWi) and the Ministry of Education and Research of Mecklenburg-Pomerania, surveyed by Research Centre Juelich PTJ.

References

[1] Baldauf, Benedict, Fischer, Gluch, Kirchhoff: Navigationsanzeigen für Schiffe mit simulationsgestützter Prädiktion. In: Prospektive Gestaltung von Mensch-Technik-Interaktion. Fortschr.-Ber. VDI Reihe 22 Nr. 25, Düsseldorf: VDI-Verlag 2007.

[2] Baldauf, Benedict, Wilske, Grundevik, Klepsvik: Combination of Navigational Equipment and VDR Based Information to Enhance Alert Management. In Weintrit, A. (Ed.): Advances in Marine Navigation and Safety of Transportation. Monograph Gdynia Maritime University (Poland) and The Nautical Institute London (UK), Gdynia, June 2007.

[3] Oltmann: "Identification of Hydrodynamic Damping Derivatives – a Pragmatic Approach", MARSIM – International Conference on Marine Simulation and Ship Manoeuvrability, Kanazawa, Japan, 2003.

[4] Benedict, Baldauf, Felsenstein, Kirchhoff: "Computer-based support for the evaluation of ship handling simulator exercise results", MARSIM – International Conference on Marine Simulation and Ship Manoeuvrability, Kanazawa, Japan, 2003.

[5] Benedict, K. et al: "Combining Fast-Time Simulation and Automatic Assessment for Tuning of Simulator Ship Models." /MARSIM. International Conference on Marine Simulation and Ship Manoeuvrability, Terschelling, Netherlands, 2006 Proceedings, M-Paper 19, pp. 1 – 9.

[6] Clarke, Horn; "Estimation of Hydrodynamic Derivatives" Proceedings of the 11th Ship Control Systems Symposium, Southampton 1997, Vol. 3, pp. 275 – 289.

[7] Fehling, S.: Investigation in planning of manoeuvring procedures by means of optimisation /Search methods and manoeuvring simulation Diploma thesis (in German), Hochschule Wismar, Dept. of Maritime Studies, Warnemuende, 2009.

[8] Fischer, Benedict: Analyses of manoeuvring procedures on ferry "Mecklenburg-Vorpommern" in Rostock port and potential improvements using alternative manoeuvring concepts with Dynamic Predictor. Internal research report, Hochschule Wismar, Dept. of Maritime Studies, Warnemuende, 2009.

HANDS-ON EDUCATION WITH MARITIME IT & AUTOMATION

Lars Lindegaard Mikkelsen,
Senior Lecturer, SIMAC
Claus Walther Jensen,
Senior Lecturer, SIMAC
E-mail: cwj@simac.dk, askholm@simak.dk

Abstract. This paper describes considerations and actions taken at SIMAC to meet the pedagogical, didactic, and logistic challenges of training the ship officer students in advanced automation and (technical) maritime IT systems. At SIMAC we have been working for several years to improve the teaching areas of IT and Automation. We know from experience that studying the theory books is not always enough, and theory does not appeal to all students.

We find a project oriented model that combines theory with practice is the most effective teaching method for this area. But getting hands on in automation gives some logistic and economic problems. This well proven model is now being further developed in combination with E-learning.

SIMAC has a lot of experience with E-learning from educating technicians for the offshore industry. When we combine this experience with teaching results in automation for maritime studies, we take the best of both to form a new concept.

With background in these considerations we will work towards combined automation training based on a flexible and mobile training kit together with with a Learning Management System, containing the theoretical lessons that support the students' work with their problem based education.

INTRODUCTION

This paper is a continuation of the paper "Automation is the new challenge in education of ship officers" presented at WMTC 2009 in Mumbai by author Mr. Claus Walther Jensen. Part 1 of this paper is mainly taken from the aforementioned paper, and part 2 is a result of thoughts and further development done by the authors as follow-up research after the many positive responses from the WMTC conference.

PART 1. AUTOMATION IS THE NEW CHALLENGE IN EDUCATION OF SHIP OFFICERS

Part 1 of this paper describes the actions taken at SIMAC to meet the pedagogical challenge of training the students in automation and technical IT systems, systems that ship officers embarking modern ships will be expected to use and maintain with advanced fault-finding included.

SIMAC is a Danish education institute preparing ship officers primarily for the Danish merchant marine. SIMAC also has a department for supplementary training, where full mission simulators and well-equipped automation laboratories are part of the training of ship officers and offshore technicians.

This paper is not based on academic research, but is based on teaching experience and participation in several training projects for new-building crews, especially projects that focus on training the crew in the new IT based control and monitoring system onboard.

Automation today

Traditionally, institutes educating marine officers all over the world have trained their students in subjects like propulsion plants, navigation, safety, maintenance, management – but have not always put enough focus on Automation and IT.

Automation and IT are now part of all new-buildings, from small ships with simple alarm systems that communicate via CANbus, to sophisticated LNG carriers, which are just as complicated as a petrochemical process installation ashore, so the process control system onboard covers several different network types, among them TCP/IP, PROFIBUS and Modbus, all communicating the process parameters between the process instruments, auxiliary units, controllers, alarm panels and the operator stations.

It is also normal to see vendors of specific maritime process equipment supply their complete units with an isolated local control system, which must then be interfaced towards the ship's main control system via defined protocols and network communication (Fig. 1).

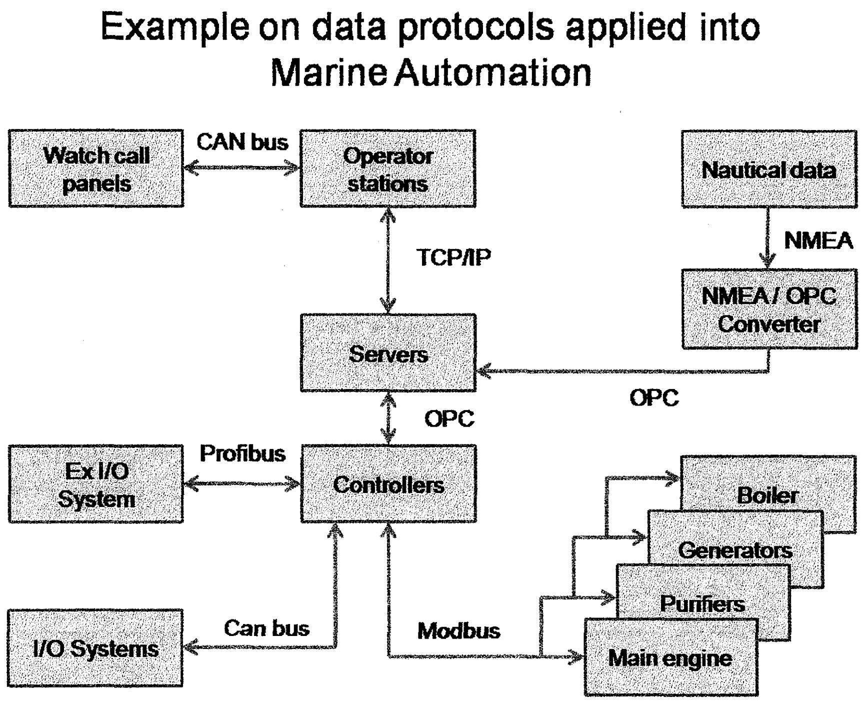


Fig. 1. Data protocols in Marine Automation

Thus a ship's network topology can be very complicated and the different technologies used for communication all have their own specific protocols; setting standards for electrical signal levels, cabling, connectors and termination. All this can make it difficult for the faultfinding crewmembers to get an overview of a fault situation (Fig. 2).

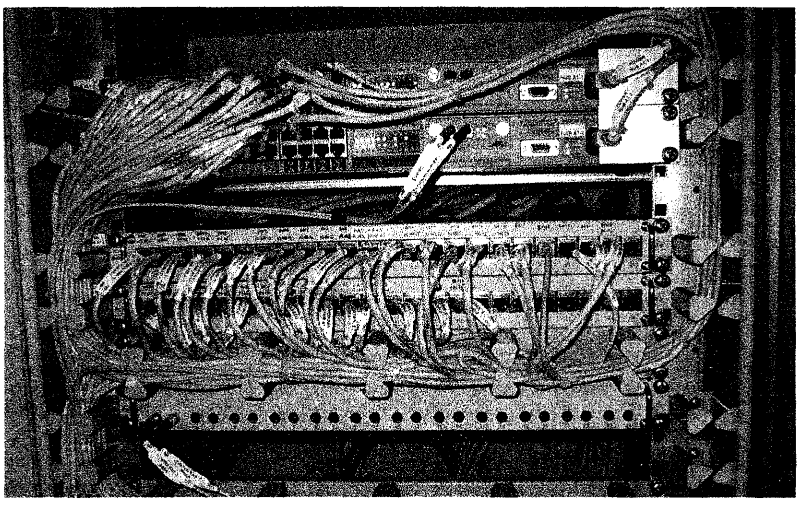


Fig. 2. Ethernet switch in the typical Control Network on a ship

The education institutes have an obligation toward their graduates, the future ship officers. The education institutes must ensure that the officers have a basic knowledge of the Automation and IT onboard and can solve basic problems on their own. At the same time, the institutes must prepare the ship officers to go into project groups concerning new-buildings and be able to discuss the level of automation and the selection of technology, and finally be able to approve the documentation supplied by the vendors, and participate in making plans for additional specific education.

Educational problem

SIMAC and other maritime academies use simulators to train students to operate advanced ship control systems. A simulator is still a very successful tool for training the operation part of the machinery installations. Simulators familiarize the students with graphic user interfaces, alarm management systems and more.

Our participation in new-building projects has shown us the need for more specific knowledge about advanced control systems. The crewmembers are nervous about taking over a new ship with highly sophisticated control systems based on advanced network technology. They complain that they are not able to fault-find in network problems since they don't have the necessary knowledge about the main components and their functions.

At SIMAC we have been teaching about the main components of control systems for a couple of years, so the students have learned about PLC (Programmable Logic Controllers), Graphic user interface, Network components and Internet technology, but always as independent topics. Because of these small-scale laboratory exercises the students have not seen the components in the right context, and do not have a complete overview of a ship's control system.

STCW and automation

The international convention on Standards of Training, Certification and Watchkeeping for Seafarers, STCW, is the main guide for all those involved in educating seafarers. The STCW is not very specific in its requirements for competences within control system objectives. The STCW code is a rather static document, while the areas of IT and automation are developing rapidly in the marine sector, so it is important that the objectives in STCW are accepted as "*The minimum standard of competences*", as stated in STCW Table A-III/2. The competences concerning control systems in STCW are specified as follows:

"Theoretical knowledge: Marine electrotechnology, electronics and electrical equipment. Fundamentals of automation, instrumentation and control systems."

These lines are of course taken out of context. They are inexact and at the same time meant as minimum requirements, so fortunately we can use them as guidelines for a very thorough automation training for ship officers. It is up to the education institutions to closely follow the technical development within this area, and to make sure that course plans and competences in house are continuously adjusted to keep up with the business community.

"Project Ship" at SIMAC

At Svendborg International Maritime Academy, we recognize the need to combine the study of machinery and electrical technology with the IT and Automation part. We are therefore in the process of modernizing our laboratory facilities to meet this new challenge.

The first part of the project was the establishment of a control system, with economic support from the Danish Maritime Fund. The topology of the control system established in the SIMAC laboratory is very much inspired by real topology diagrams from advanced ships (Fig. 3).

The result of all this modernization will be a fully automated laboratory with the most important machinery installations found on a ship. The project has been given the name "Project Ship" to make it clear that study conditions are the same as onboard a real ship.

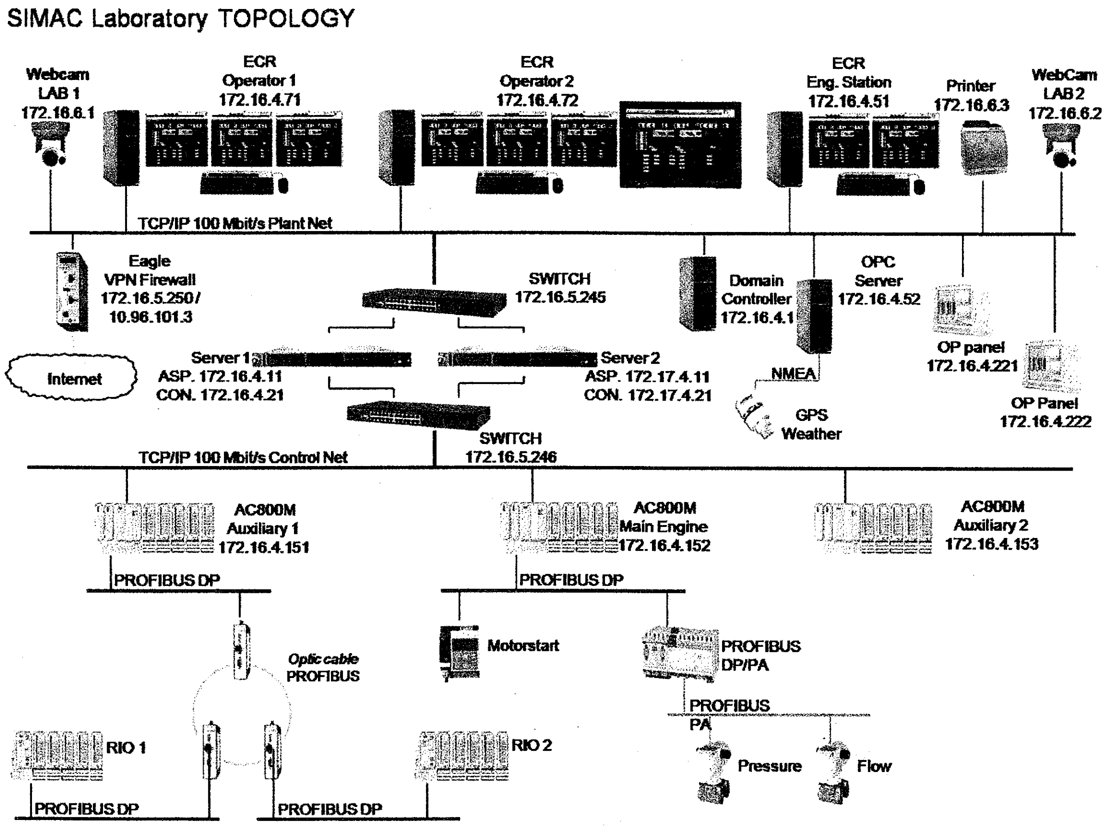


Fig. 3. Topology diagram for the control system in the laboratory

SIMAC started by establishing a distributed control system with control room and facilities for three groups of students to work at the same time.

In future we will connect all the necessary auxiliary systems to this infrastructure in the laboratories.

These facilities make interdisciplinary training possible, so the same laboratory exercises combine the mechanical, electrical, automation and IT aspects. The setup also gives students a great opportunity to define their own exercises/projects and investigate problems from new angles, using the built-in data logging and trend curve function for all objects.

The new control system makes it possible to fault-find on network technology and bus communications in a real context. The students can study the documentation and try some faultfinding exercises among the components in a real control system.

Historical process data can be retrieved from the database as well as from event- and alarm logs, so different process data can be held up against different load conditions or a fault situation, often leading to a new understanding of the possibilities with automation.

This setup will give our students an excellent opportunity to study how communication in control systems works. We set up appropriate faults to train the students to track faults and familiarize them with the main components of a modern control system.

To give the students and guests an idea of how ships could be monitored from ashore, three web-cameras have been added to the laboratory. When these are included in the network VPN connection, we hope they will encourage the students to work with projects about distance monitoring of ship installations in the future.

Students as programmers

The control programs in the controllers will be programmed by some of our students and then checked by the lecturers.

We have already completed the first part of this "Project Ship" by adapting the control system onto the B&W main engine.

This first programming job was done by two students in cooperation with a senior officer from a Danish shipping company (Fig. 4), and resulted in a project to improve the operator interface (HMI) for manoeuvring the main engine.

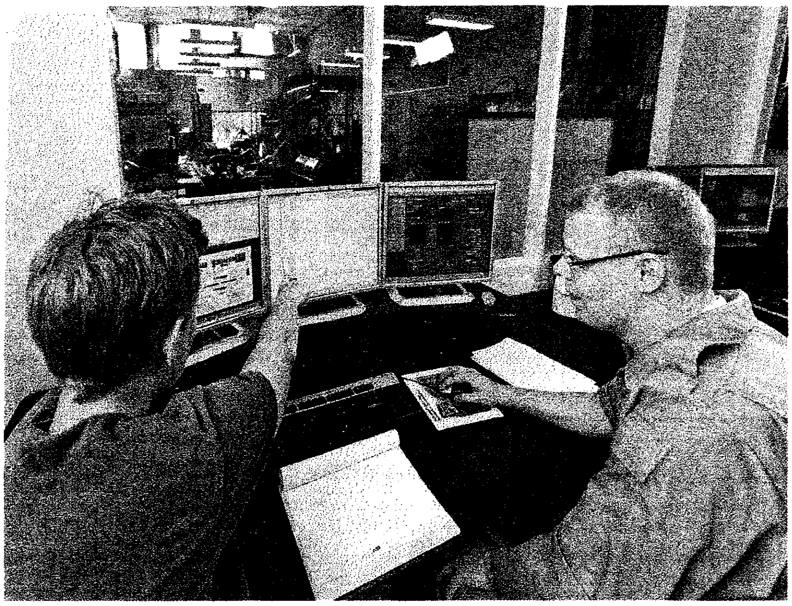


Fig. 4. SIMAC students as programmers

The start and stop program for the main engine was programmed in the programming language "Sequential Function Chart" in accordance with IEC 61131-3.

The traditional sequential process for starting the main engine is now visualized on the operator stations step by step, and each transition condition can also be seen on the screen (Fig.5).

As a result of this programming project, the 52-inch screen in the control room is now often used as a pedagogical tool to explain the necessary auxiliary systems, which must be started and monitored during the start up process.

The further phases of "Project Ship" at SIMAC consist of programming control programs for the machinery equipment and designing the user interface. These will be done by the students as part of their bachelor projects or other projects relevant to their education as ship officers. Letting the students be programmers has a positive side effect. They know much more about it, have accepted it and are now keen to get involved in the upcoming work within the project.

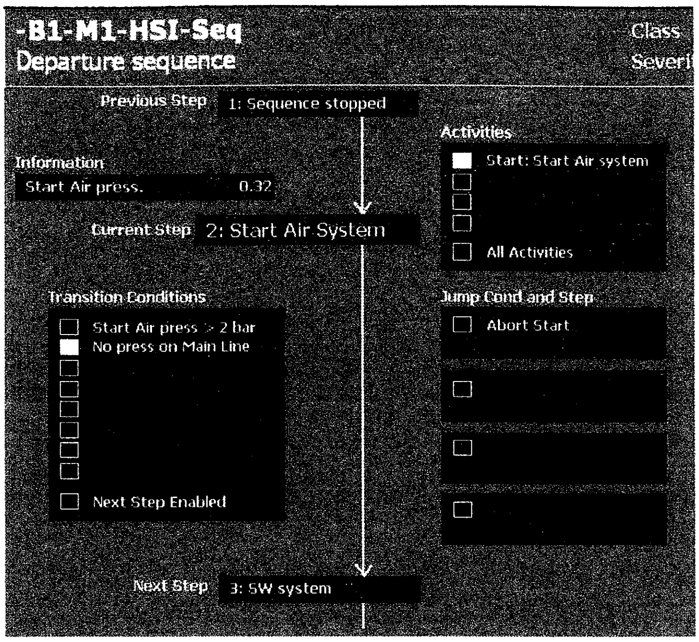


Fig. 5. Graphic presentation of sequential process

Joint venture with vendors

The modernization process in SIMAC laboratories will be a financial burden, which must be solved in partnership with maritime based companies. SIMAC offers the companies the opportunity to have their modern equipment on display in the laboratory for the maritime decision-makers of tomorrow. SIMAC offers the physical installation as well as the programming of the equipment so it will become part of the "Ship's" control system and can be used to train the new officers.

Vendors can also use the laboratory as a showroom for their customers and/or SIMAC students can participate in full-scale tests on new equipment, a clear advantage for both the students and the vendors.

Educating the lecturers

The new IT and Automation education challenge is not only a problem for the students. The lecturers at the education institutes must be educated in this technology as well, and at a relatively high level to ensure that the right methods will be used to train the ship officer students afterwards.

In Denmark there is an ongoing project set up by the "Danish Maritime Authority" to educate the majority of the lecturers at the maritime education institutes to the level of master's degree. This educational program has been a great opportunity for the lecturers to reach the necessary level in Automation and IT, ensuring that we can meet the Automation and IT education challenge.

PART 2. AUTOMATION EDUCATION SUPPORTED BY A FLEXIBLE MOBILE TRAINING KIT AND ONLINE LESSONS

At SIMAC we have been working for several years to improve the teaching area of IT and Automation. We know from experience that studying the theory books is not always enough, and theory does not appeal to all students. The majority of our students are more interested in practice. They want to dive into the technical and practical stuff and get hands on. We find a project oriented model that combines theory with practice is the most effective teaching method for this area. But getting hands on in automation gives some logistic and economic problems. The hardware and software are often very expensive. Our model starts with the teacher giving a class lesson and afterwards groups work hands on with a problem based on a case story. They configure hardware and program software, produce documentation, perform tests and record their conclusions. They are inspired to pay attention and then work out their own solutions using marine automation.

This well proven model is now being further developed in combination with E-learning.

SIMAC has a lot of experience with E-learning from educating technicians for the offshore industry. When we combine this experience with teaching results in automation for maritime studies, we take the best of both to form a new concept. With background in these considerations we will work towards a new learning program based on a Learning Management System containing the theoretical lessons that support the students' work with their problem based education. A unique training kit that contains the necessary hardware to prove the theories provides further support. The teaching will be based on a new generic training model (Fig. 6) inspired by models from the area of software development.

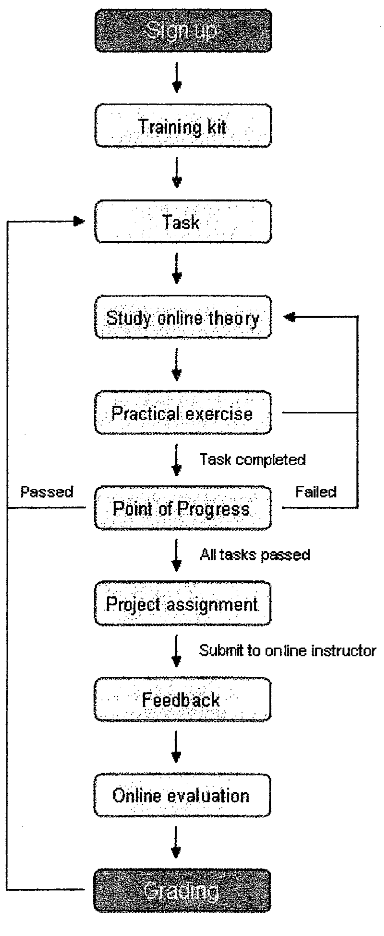


Fig. 6. Generic training model

The practical exercise will be at iterative process as a combination of theory and exercise.

Testing the training model

The combined training model has been tested by three Indian students from AMET University in Chennai, who visited SIMAC for eight weeks in spring 2009 to gain knowledge within marine automation to improve their bachelor project as marine engineers (Fig.7) Ram, Arun and Nithin followed several lessons and from there they worked on their own by following the online material on SIMAC's web server. They improved their skills by challenging each other against the tasks and the training kit.

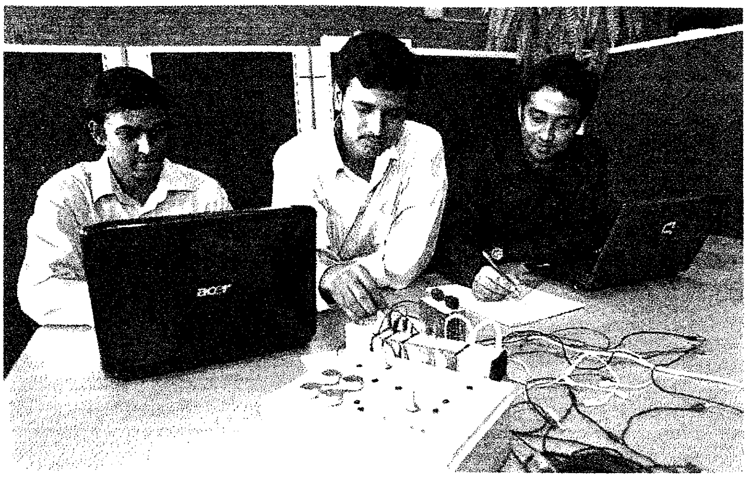


Fig. 7. AMET students working online with their training kit

The students from AMET University had a final assignment: to produce a complete automation system for a diesel driven emergency generator. Their presentation of this job for the lecturers at both AMET and SIMAC was to be done as a WEB demonstration of their work, specifically their automation system, including their WEB visualized user interface.

The demonstration took place on the 4th May 2009 (Fig. 8). The lecturers and students were ready in their auditoriums and the performance was a great success. Afterwards we had a very positive response from both students and staff of AMET University.

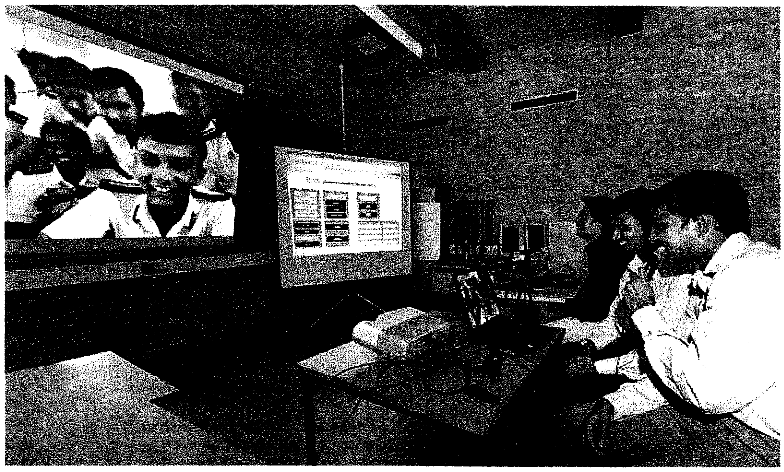


Fig. 8. AMET students presenting their work to their colleagues at AMET

CONCLUSION

Now that we have recognized the need for a thorough training in maritime automation for the students who will become ship officers, we also must face the fact that theoretical lessons are not always enough, and theory does not appeal to all students. The majority of our students are more interested in practice. They want to dive into the technical and practical stuff and get hands on. At SIMAC we have faced the facts and are working to develop the most beneficial way of improving our automation training so the students get the most out of it, but we must still consider a realistic economy. The combined learning method that supports class lessons with online lessons and the physical training kit has proven to be profitable, and will certainly be part of the education and training going on at SIMAC in the future.

The new combined training program can also be used by former students, now crewmembers, to train the skills needed in the new areas of advanced maritime IT and automation.

APPLICATION AND DEVELOPMENT PLAN OF AIS IN KOREA

Jinsoo Park,
PhD, Prof.
Dean College of Maritime Sciences, Korea Maritime University
Joung-Soo Roh,
Senior Managing Director, GMT Cybernetics
Byeong-Deok Yea,
PhD, Prof., Division of Navigation Science, Korea Maritime University
E-mail:jspark@hhu.ac.kr

Abstract. The AIS system has been established and operated for maritime safety and security, and protection of marine environment in Korea after the Performance Standard of AIS was adopted by IMO in 1998. 37 AIS shore-based systems have been established to monitor ships within 100 nm from all coasts of South Korea in real time, and the AIS information from the 37 AIS shore-based systems is integrated into the National AIS (NAIS) system.

NAIS information has been used by the maritime related organizations to monitor vessels for safe navigation, maritime security and environment concerns. In addition, the Information Service has been operated via AIS network, which provides safety related information, maritime accident information, weather information, news, etc.

AIS will be used for not only situation awareness and monitoring vessels but also analysis of maritime traffic risk and support of decision making with archived AIS data and maritime traffic status. Moreover, the Global integration with not only neighbor country's system but IALA-Net, MSSIS, MEH and other international maritime systems will be implemented.

1. INTRODUCTION

The AIS (Automatic Identification System), the navigational equipment which has been in use after the introduction of the Radar system at seas, serves to improve the navigation environment in an epoch-making manner. In the past, numerous equipments and systems were introduced for vessels to detect the operational status of nearby vessels and the AIS system has allowed the mutual exchange of digital information among the vessels in real time, thus heralding the beginning of actual-information based navigation.

This document explains the history and status of AIS implementation in Korea and also details how the AIS is utilized by government and civilian organizations. Therefore, its usage on land, i.e. in the ship-to-shore field, rather than at seas is extensively dealt with.

2. CONSTRUCTION OF NATIONAL AIS

(1) Status of NAIS Implementation

In accordance with the adoption of the Performance Standards and functional requirements of the AIS in the year of 1998 and the amendments of the SOLAS convention in the year of 2002 by the International Maritime Organization, ships and coastal nations have begun to employ the AIS as major equipment for safe navigation and ship control.

In Korea, with the launch of the feasibility study and execution design for the construction of the AIS base station in the year of 2001, it has taken 7 years and 6 billion Korean Won to build 12 operation centers (VTS center) and 37 base stations in the coastal areas all over Korea.

Dual processing facilities have been introduced in the major base stations which take care of harbors and these dual processing facilities are run non-stop, thus enhancing the system availability and effectiveness.

Also, the entire coast in Korea has been divided into 3 major bodies of water, namely, the East Sea, the West Sea and the South Sea and the AIS information is synchronized through the real-time networks. The AIS information from all base stations is consolidated at the GICOMS (General Information Center on Maritime Safety and Security) and is operated as NAIS (National AIS)., thus exercising consolidated control of the AIS information over a wide area.

The characteristic feature of the base stations in Korea is that the high altitudes of mountainous terrain above sea level where the base stations are located (maximum of 1100 meters) permit the real-time monitoring of the entire water body within 100 nautical miles off the coastline and by constructing base stations on nearby islands, the coverage of the sea by AIS base stations is maximized.

It is utilized for the purpose of safety, security, environmental protection etc. in the maritime field.

(2) Carriage Requirements in Korea

Domestic law (Korea Ships Safety Act) has been amended to include the installation of the AIS in accordance with the SOLAS convention and the AIS installation requirement has been further enforced on coastal ships to install the AIS on board. As can be seen in the table, it has been made mandatory even for small-size ships which require safety management such as tug boats, fishing boats measuring more than 45 meters and passenger ships to install AIS terminal to maximize the effects of the AIS implementation throughout the coastline all over Korea. The number of Korean flagged vessels on which the AIS is installed amounts to 2,472 as of 2008.

The Korean government is reviewing the mandatory implementation of the equipments transmitting ships position including Shipborne AIS terminals on leisure boats, small-sized fishing boats etc.

3. APPLICATIONS OF AIS

(1) Information Sharing

Basically, the NAIS information is accessible by about 10 government institutions such as harbor and coastal VTS center, Korea Coast Guard, Korea Navy, The National Emergency Management Agency, CIQ etc. which are networked together; they utilize the real-time AIS traffic image for the purpose of navigation safety and maritime security management.

- VTS Integration Monitoring

The scheme of integrating the AIS information into the VTS has been implemented right from the beginning of the AIS construction; AIS target and radar target are integrated and the entire system is being operated. This has resulted in the expansion of the VTS function to include monitoring reaching up to the coastal and farther regions from its initial monitoring of only the port areas.

Not only the AIS base stations but AIS base station for each harbor area are collectively monitored by the VTS center and for the sake of control of passenger ships and small-sized dangerous cargo over a wide range of areas, AIS information is utilized by integrating sea areas of the East Sea, West Sea and the South Sea regions. Also, VTS not only provides the ship monitoring service but also text-based safety information service by making use of the AIS networks.

- Korea Coast Guard (including SAR Aircraft AIS)

The Korea Coast Guard, consisting of 4 offices and 14 stations all over Korea, is updated with the integrated AIS information in real time and such information is utilized for maintaining maritime security and Search and Rescue operations. Especially, the AIS is installed in the SAR (Search and Rescue) aircraft of the maritime police and the Marine Rescue Coordination Center, maritime police vessels and SAR aircrafts carry out SAR operations three-dimensionally.

- The Navy and Intelligence agency

South Korea is, at present, technically at war with North Korea and it is not an exaggeration to say that the maritime security activities on the Korean waters are more intensive than anywhere in the world. All navy ships are equipped with the AIS terminal to monitor the seas, various military institutions are currently carrying out operations by actively utilizing the NAIS information, the AIS information is also made use of in the counter-terror operations and risk management areas as well.

(2) Passenger ship Monitoring

AIS is installed on about 200 ships such as international and national coastal passenger ships, which operate with Korea as the home port and it is possible to monitor most of these vessels within 100 nautical mile radius in real time.

The detailed way points of the fixed navigation routes and safe navigation ranges for all passenger ships are constructed as a database and so, should a passenger ship deviate from its navigation route for no particular reason, route deviation warning sets off and the situation is immediately reported to the operation man-in-charge, the concerned shipowner and relevant organizations. Similarly, should the speed of a vessel on its normal navigation route decrease below 5 knots, an alarm sets off, which will bring to the attention of all those concerned about the dangerous situation the vessel finds itself in.

In the case of those passenger ships operating over long ranges, they are out of the VHF range and therefore, operational information is exchanged through AIS text-based broadcast.

(3) Tanker Exclusive Zone Monitoring

The Maritime Traffic Safety Act dictates that the operation of tankers be prohibited within about 15 nautical mile radius off mainland coast to minimize the damage in case of an oil spill.

Tankers carrying liquid oil cargo of more than 1500 tons must not navigate in the tanker exclusive zone unless it experiences danger to its safety owing to deterioration of weather conditions etc. or in case of emergencies. Once a tanker finishes loading the liquid oil cargo and departs a port, the cargo information of the captioned vessel is entered into the Port-MIS(Port Management Information System) and the data are transferred to the integrated database of GICOMS; linked with the information on the real-time location of the tankers from the AIS, it monitors whether or not tankers intrude into the tanker exclusive zone.

If a tanker carrying a liquid oil cargo enters a tanker exclusive zone, the monitoring system displays the alarm and the detailed information of intrusion to the operator and the details are immediately relayed to the shipowner, the captioned vessel, Korea Coast Guard, and other related organizations to guide the vessel move away from the tanker exclusive zone.

(4) Dumping Area Monitoring

As a matter of principle, Korea prohibits the dumping of waste matter into the sea, however, in accordance with the London Convention and Maritime Environment Maintenance Act, for the purpose of reducing the amount of waste to be processed on land and protecting the coastal areas, some of the wastes, which do not pose harmful effects to the marine environment and which are easily biodegradable can be dumped at sea, more than 100 nautical miles off the coastline.

Once a waste cargo disembarks with the permission to dump waste at a designated location, the "Dumping Area Monitoring" monitors the operational status, the designated location and the status of dumping. Especially, at the waste dumping valve, the motion sensors and AIS terminals are connected, which makes it possible to monitor the opening and closing of the valve from land; if the waste dumping valve is open at a location other than the designated location, system alarm sets off, which immediately notifies the person-in-charge of the dumping status. This information is made available to the shipowner, the vessel etc.

This system allows us to manage the amount of waste dumped at sea and, it will be possible to understand and evaluate the extent of pollution and the changes in the marine environment by limiting and managing the maximum amount of the waste dumped for each designated water body.

(5) Dredging Ship Monitoring

The "Aggregate Extraction Act" dictates that extraction work of permissible amount in designated areas be carried out if marine aggregates are to be extracted.

The aggregate extraction ship monitoring system monitors the entire process right from the disembarkation of the vessel to its extraction work status in the designated area by making use of the AIS location information. The extraction work is always carried out when the vessel is in a state of rest and therefore, if the vessel is stopped at a location other than a location in the designated water body, the monitoring system concludes that the extraction work is being carried out in an unauthorized location; an alarm is set off and information regarding the unauthorized work is provided to the administrator. The relevant information is relayed to the shipowner, the vessel and concerned organizations, which enable immediate counter measures to be taken.

Operation of such a system aims to notify the ship operators of the monitoring system in use and to prevent the ship operators from committing illegal offenses and guide them in the right direction, rather than monitor the illegal offenses or enforce restraints.

(6) DGPS Correction Data Service

In Korea, DGPS Corrected Signal Service is provided throughout the sea of the entire peninsula through the 17 DGPS Correction reference stations. The errors in the GPS information received at the reference stations are corrected and the corrected signal is relayed in real time to the ships in the RTCM SC-104 format by making use of the medium electric waves.

However, on small-sized ships with the exclusion of large-sized ships, expensive beacon receivers are not installed and so as to maximize the effects of the DGPS service, small-sized ships avail themselves of the AIS-based DGPS corrected signal service.

In the AIS technical standards, it is stipulated that the AIS message 17 be utilized as the DGNSS corrected signal message and if the AIS message 17 is broadcast from the shore-based AIS transponder (or transmitter-receiver), the shipborne Class A terminal, after taking into account the received correction information, transmits corrected information of the ship's location of within 10 m accuracy.

At present, the AIS-based DGPS corrected signal service is mainly provided for major ports and departure & entry navigation routes; even though differences might arise depending on the shipborne AIS the location is corrected in such a way that the accuracy error is less than 10 m. The service usage results of last month show that for certain sea area in Korea, when the AIS DGPS corrected information service is not utilized, the percentage of ships transmitting accurate DGNSS locations was at 13 % (equipped with beacon receiver) while the AIS DGPS corrected information service is in use, it has been shown that the accuracy of 86 % of the ships changed to DGNSS.

From the viewpoint of ship control by VTS, the importance of the AIS-based location information is gaining ground and the accuracy of the AIS-based location information is uniformly implemented in many ships, which has made more accurate ship control possible.

(7) AIS AtoN (including Virtual AtoN)

To realize the remote control of the Aids to Navigation and information service, IALA makes use of the AIS to recommend that the AIS AtoN is to be managed and serviced at the same level as the AIS.

In accordance with the above, in Korea, AIS AtoN is installed onto the existing Aids to Navigation, which has enabled us to provide accurate information on the Aids to Navigation; from the viewpoint of AtoN facility management, it has become possible to monitor and remotely control the status of the Aids to Navigation in real time by making use of the AIS communication channel, which in fact has maximized the effectiveness of the AtoN service management.

Also, if the Aids to Navigation are temporarily damaged, lost, or if it is deemed difficult to install the Aids to Navigation due to current or water depth or if it is difficult to install them in waters of less frequent navigation by committing a large amount of budget, or if there occurs a capsize of a vessel or a high-alert area due to military training, navigation information becomes much useful through the virtual AIS.

Virtual AIS broadcast through a AIS base station is currently under way and it serves as emergent Aids to Navigation without committing a budget for separate facilities.

(8) Navigational Information Service

Also, the AIS, being a VHF-based two-way data communication networks serves as the network of information exchange between ships and land facilities. Maritime Safety Information Service such as the safety information, accident information, weather information, news etc. on the GICOMS is provided through the AIS network.

4. FUTURE PLAN FOR AIS

The effectiveness of the AIS at seas in the areas of safety, security and environmental protection has been proven worldwide and measures will be taken to expand the usage of the AIS. At present, mid-sized and large vessels are equipped with AIS terminals, however, to ensure the safety of all ships, safety and security measures must be expanded to install simple terminals even on small-sized vessels such as fishing boats, leisure boats etc.

The basic maritime functions of the AIS such as the situational awareness, monitoring etc. are expanded to analyze maritime traffic risk and based on the analyzed AIS data, decision-making support system in line with the maritime traffic situation is constructed; by executing the VTM based on these systems will serve as a major factor in realizing e-Navigation.

What is more, to achieve control over wide area (global), beyond domestic ports and coasts, Far East Maritime Safety Network will be constructed through sharing of AIS information among Korea, China and Japan in real time and plans are currently under way to connect international networks such as the IALA-Net, MSSIS, MEH etc.

References

[1] International Telecommunication Union, ITU-R M. 1371-3 Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile band, 2007.

[2] International Maritime Organization, SOLAS Convention Chapter V. Safety of navigation, 2002.

[3] International Association of Marine Aids to Navigation and Lighthouse Authorities, IALA Recommendation A-124 On Automatic Identification System (AIS) Shore Station and Networking Aspect relating to the AIS Service, 2005.

[4] Ministry of Land, Transport and Maritime Affairs, Project Report of NAIS Construction, 2003 – 2008.

[5] Ministry of Land, Transport and Maritime Affairs, Standard of Ship's Equipments, 2004.

THE EFFECT OF BILGE GEOMETRIES ON RESISTANCE IN DISPLACEMENT BOATS AND IMPORTANCE FOR THE SHIP INDUSTRY

S. Aydın Şalci,
Prof. Dr.
E-mail: salcia@itu.edu.tr
Munir Suner,
Lecturer, PhD Canditate
Istanbul Technical University, Maritime Faculty
E-mail: msuner@itu.edu.tr

Abstract. It is a fact that a bilge, which connects the board with bottom is an important part of ship geometry in ship building. The shape of bilge, which is supported by Marcin bracket inside and carries the bilge keel outside, has a considerable effect on the formation of bilge vortices, rolling motion, transverse geometric stability, mid-ship section coefficient and the ship resistance.
In this study the resistance and power alteration in alternative bilge geometries have been investigated by taking a ship form without deadrise as the main figure. The alteration of resistance and power have been studied by using the Ship Model Experiment Technics. Rectangle, double-chain and round forms were used as alternative bilge geometries.
Model experiments done in three different loading conditions, empty, loaded and excessively loaded. The results were transferred into the values of a ship by appliying the simialrity laws.
The effects of the bilge geometry are presented at the end of the study. Furthermore the effects of the results in ship building sector are disscussed as a conclusion.

1. INTRODUCTION

It is a fact that bilge, which connects the boards with bottom is an important part of ship geometry. The shape of bilge, which is supported by Marcin bracket inside and carries the bilge kneel outside, has a considerabl effect on the formation of bilge vortices, rolling motion, transverse geometric stability, mid-ship section coefficient and the ship resistance.

In this study, the resistance and power alteration in alternative bilge geometries have been investigated by taking a ship form whitout deadrise as the main figure. The alteration of resistance and power have been studied by using the Ship Model Experiement Technics. Rectangle, double-chin and round forms werw used as alternative bilge geometries. A wooden ship model whose lenght of load waterline was L*** = 1,640 meters and wose similarity ratio was $\alpha = 50$ was used in experiment.

Model experiments were done in three different loading conditions- empty, loaded and excessively loaded. There was no appendage on the model and the experiment was done without a trim. In order to observe the effect of bilge geometry better, the parallel body of ship was chosen comparatively large. According to the results of the experiment, double-chin form produced the minimum resistance after a certain value of velocity, 1 m/s.

As can be expected, the form which produced the maximum resistance was the rectangular form. The experiments were done in Ship Model Basin of Istanbul Technical University(I.T.U). The model ship was towed on smooth water conditions; the velocities were measured by a tachometer generator and the resistance was measured by Atwood dynamometer. The results of the experiments were transferred into those values of the ship by applying the similarity laws.

The calculations for resistance were realised in two different ways- one by Froude hypothesis and the other by Hughes hypothesis (Form Factor Method).

In the calculations done by Hughes hypothesis, the extrapolator diagram was modified by means of a mathematical transformation and the form factor was obtained. So by using a single model instead of an extrapolatorcurve which needs more than one model, it was possible to obtaine a form factor(but by the help of a transformed extrapolator). The changes(alternations) in resistance and power as a function of draught were studied for three different bilge geometries as well.

In order to provide flow similarity(Reynolds similarity) turbulance generator was placed at the bow of model. The diameter of the circular-section of trip wire which was used as the turbulance generator was determined by taking a boundary-layer thickness into consideration. In calculation the friction resistance, ITTC-1957 formula was used.

2. ANALYTICAL MODELLING

Total hydrodynamic resistance force in displacement boats is formed under the influence of a number of parameters.

$$R_t = f(V, L, Fr, Re, LCB, \frac{L}{B}, \frac{B}{T}, \alpha_E ...). \tag{1}$$

In order to determine the effect (influence) of each of these parameters on resistance, model series which are very common and can be taken as referance are chosen and systematical ship-model experiements are done. These experiments can be realized at the towing tank or at the circulating channel. In this study systematical experiements were done with a ship modelwhose paralel body lenght was rather long (Landing Craft) and these experiements were conducted at different loading conditions and with different bilge geometries. As a result, alterations in resistance were obtained. By applying the laws of similarity the data of the experiment was transformde into the values of the ship (prototype).

The analysis of total hydrodynamic resistance can be made in two different ways.

a) Froude Hypothesis:

$$R_t = R_f + R_r; \tag{2}$$

b) Hughes Hypothesis:

$$R_t = R_v + R_w. \tag{3}$$

In these equations,

$$R_t = total\ resistance$$
$$R_f = frictional\ resistance$$
$$R_r = resuduary\ resistance$$
$$R_v = viscous\ resistance$$
$$R_w = wave\ resistance$$

2.1. Froude Hyphothesis

$$Rt(Re, Fr) = Rf(Re) + Rr(Fr) \qquad [\text{Kafali,1}],[\text{Kafali,2}],[\text{Comstock,3}] \tag{4}$$

$$Rf = Cf \cdot \frac{\rho}{2} \cdot v^2 \tag{5}$$

$Cf = 0,0075/(Log\ Re - 2)^2$ [*ITTC*-1957].

If $Fr_m = Fr_p$, then $(R_r/\Delta)_m = (R_r/\Delta)_p$ and when we write $\gamma = \rho \cdot g$ and

$$\frac{R_{rp}}{R_{rm}} = \Delta_p / \Delta_m = \gamma_p \cdot \nabla_p / \nabla_m, \tag{6}$$

then

$$\frac{R_{rp}}{R_{rm}} = \Delta_p / \Delta_m = \rho_p / \rho_m \cdot \alpha^3 \tag{7}$$

is obtained.

According to hyphothesis:

when $R_{tm} = R_{fm} + R_{rm}$ is written fort he model and $R_{tp} = R_{fp} + k.R_{rp}$ is written for the prototype (here k is a correlation factor which is constant, $k = 1{,}15$) then,

$$R_{fp} = C_{fp} \cdot \rho_p / 2 \cdot S_p \cdot v_p^{\ 2}, \tag{8}$$

$$R_{rp} = \rho_p / \rho_m \cdot \alpha^3 \cdot R_r, \tag{9}$$

$$R_{tp} = C_{fp} \cdot \rho_p / 2 \cdot S_p \cdot v_p^{\ 2} + 1.15 \cdot \rho_p / \rho_m \cdot \alpha^3 \cdot R_{rm} \tag{10}$$

is obtained.

In this equation, $S_p = \alpha^2 \cdot S_m$ and for the $Fr_{mp} = constant$

$$(V / \sqrt{L})_m = (V / \sqrt{L})_p \rightarrow (V_p / V_m) = (\sqrt{L_p} / \sqrt{L_m}) = \sqrt{\alpha}\,; \tag{11}$$

$$V_p = \sqrt{\alpha} \cdot V_m. \tag{12}$$

On the other hand,

$$R_{rm} = R_{tm} - R_{fm} = R_{tm} - C_{fm} \cdot \rho_m / 2.S_m \cdot v_m^{\ 2}; \tag{13}$$

$$\left(C_f\right)_{m,p} = 0{,}0075 / \left[log\left(Re\right)_{m,p} - 2\right]^2 \text{ [ITTC-1957].} \tag{14}$$

In this equation

Re: Reynolds number, $Re = v \cdot \dfrac{L}{\vartheta}$;

Fr: Froude number, $Fr = \dfrac{V}{\sqrt{L}}$;

Cf: Coefficient of frictional resistance;

ρ : Specific density of fluid;

S : Wetted surface area;

V: Forward velocity of body (knot), (1 knot $\approx$ 0,5144 m/s);

v : Forward velocity of body (m/s);

ϑ : Kinemati viscosity of fluid;

g : Gravitaitonal acceleration, $g = 9{,}81$ m/s^2;

L : Body lenght (ship or its model);

Δ : displacement.

2.2. Hughes Hypothesis

In this hypothesis, the total hydrodynamic resistance is divided into resistance components as, $R_t(Re, Fr) = R_v\left(Re\right) + R_w\left(Fr\right)$, [1], [2], [3].

According the hypothesis, form factor is defined as

$$K = \frac{R_{vp}}{R_{fp}} - 1 = \frac{C_{vp}}{C_{fp}} - 1. \tag{15}$$

Form factor gives the transformation (passage) between two or three dimensional surfaces. Extrapolator diagram is needed to find *K*.

Therefore, by writing

$$R_{vp} = R_{fp}\left(K+1\right); \tag{16}$$

$$R_{tp} = R_{vp} + R_{fp} \tag{17}$$

and by taking Froude Similarity,

$$Fr_m = Fr_p \rightarrow C_{wp} = C_{wm}; \tag{18}$$

$$C_w = R_w / \rho / 2.S.v^2; \tag{19}$$

$$R_{tp} = \left[C_{tm} + (1+K)\left(C_{fg} - C_{fm}\right)\right] \cdot \rho_p / 2 \cdot S_p \cdot v_p^{\ 2} \tag{20}$$

are obtained. In this equation;

K = Form factor;

C_v = Coefficient of viscosity resistance;

C_t = Coefficient of wave resistance.

In order to calculate the form factor, point $C_w = 0$ is to be determined in $C_t = f\left(Re\right)$ diagram. At this point, visosity resistance curve is the envelope ot totalt resistance curve. If $Re = Re*$ at this point, then

$$Re = Re*;\ C_{wm} \rightarrow 0 : C_{tm} = C_{wm} = \left(1+K\right)C_{fm} \tag{21}$$

and the variable transformation

$$\text{Log}\, Re - 2 = x \text{ and } x^{-2} = X. \tag{22}$$

When $C_t = f\left(X\right)$ modified extrapolator diagram is drawn, then C_f : ITTC -1957 curve and also C_v vicosity resistance curve are turned out to be straight lines passing through the origin. In this diagram C_v curve is straight line whih is tangent to C_t total resistance curve nd whic passes through the origin, the touching point is $Re = Re*$.

In this diagram, $\left(\frac{\partial C_t}{\partial X}\right)\Bigg\|_{x=0} = \tan\Theta = 0.075 = \text{constant} \rightarrow \Theta = 4.289^\circ$ is obtained.

3. EXPERIMENTAL MODELLING

3.1. Experimental Data

The model used in the experimetn was wooden and painted, with no appendages and bulb and had an $\alpha = 50$ similarity ratio and was in paralel floating condition (no trim). A turbulance generator trip wire wwith a 1.5 mm diameter was pled at the bo of the model to provide Reynolds flow similarity.

The ship model was towed in three different loading conditions coded as WL 3, WL 4 and WL 5.

With the application of similarity las, transfer from the model to the prototype was made by taking the standard conditions for sea water and dimensions of model ship as

$t_p = 15\,\mathrm{C}^\circ \rightarrow \rho_p = 104{,}61\,\mathrm{kg.s^2.m^{-4}},\quad v_p = 0{,}1191.10^{-5}\mathrm{m^{-2}.s^{-1}}$

$L_m = 1{,}620,\quad \Delta_m = 16{,}564\,\mathrm{kg},\quad S_m = 0{,}524\,\mathrm{m^2},\quad \rho_m = 101{,}84\,\mathrm{kg{\times}s^2},\quad V_m = 0{,}11.10^{-5}\mathrm{m^2.s^{-1}}$

The results of experiment are as follows for rectangular, double-chin and round geometry in Table 1, 2 and 3.

Table 1

Ship with rectangular bilge geometry

Vm (m/s)	WL 3 (kg)	WL 4 (kg)	WL5 (kg)
0.40	0.038	0.040	0.048
0.50	0.050	0.055	0.065
0.60	0.068	0.076	0.088
0.70	0.085	0.099	0.120
0.80	0.115	0.130	0.165
0.90	0.155	0.175	0.227
1.00	0.215	0.250	0.325
1.10	0.287	0.350	0.437
1.20	0.375	0.480	0.574
1.30	-	0.695	0.815

Table 2

Ship with double chin bilge geometry

Vm (m/s)	WL 3 (kg)	WL 4 (kg)	WL5 (kg)
0.40	0.040	0.045	0.050
0.50	0.052	0.056	0.065
0.60	0.068	0.075	0.087
0.70	0.088	0.097	0.116
0.80	0.115	0.130	0.156
0.90	0.150	0.188	0.210
1.00	0.210	0.255	0.305
1.10	0.305	0.368	0.468
1.20	0.416	0.495	0.588
1.30	0.515	0.643	0.700

Table 3

Ship with round bilge geometry

Vm (m/s)	WL 3 (kg)	WL 4 (kg)	WL5 (kg)
0.40	0.035	0.043	0.051
0.50	0.050	0.058	0.051
0.60	0.068	0.078	0.095
0.70	0.090	0.110	0.125
0.80	0.120	0.143	0.163
0.90	0.155	0.194	0.228
1.00	0.215	0.277	0.320
1.10	0.305	0.380	0.476
1.20	0.407	0.498	0.585
1.30	0.590	-	-

The experimental data was pbtained in smooth water surface (no waves) conditions. Fort he to towing experiments following one another, enough time was given to maket he water surface smooth again.

3.2. Results

The results of the experiment can be evaluated in several different ways by using the methods mentioned in analytical modelling and by using the laws of similarity.

Model resistance characteristics for each bilge geometry – Fig. 1, double hull resistance coefficient curve for WL4 – Fig. 2, form factor change according to draft for each bilge geometry – Fig. 3, prototype resistance characteristic – Fig. 4 and power- draft linkages – Fig. 5 are presented.

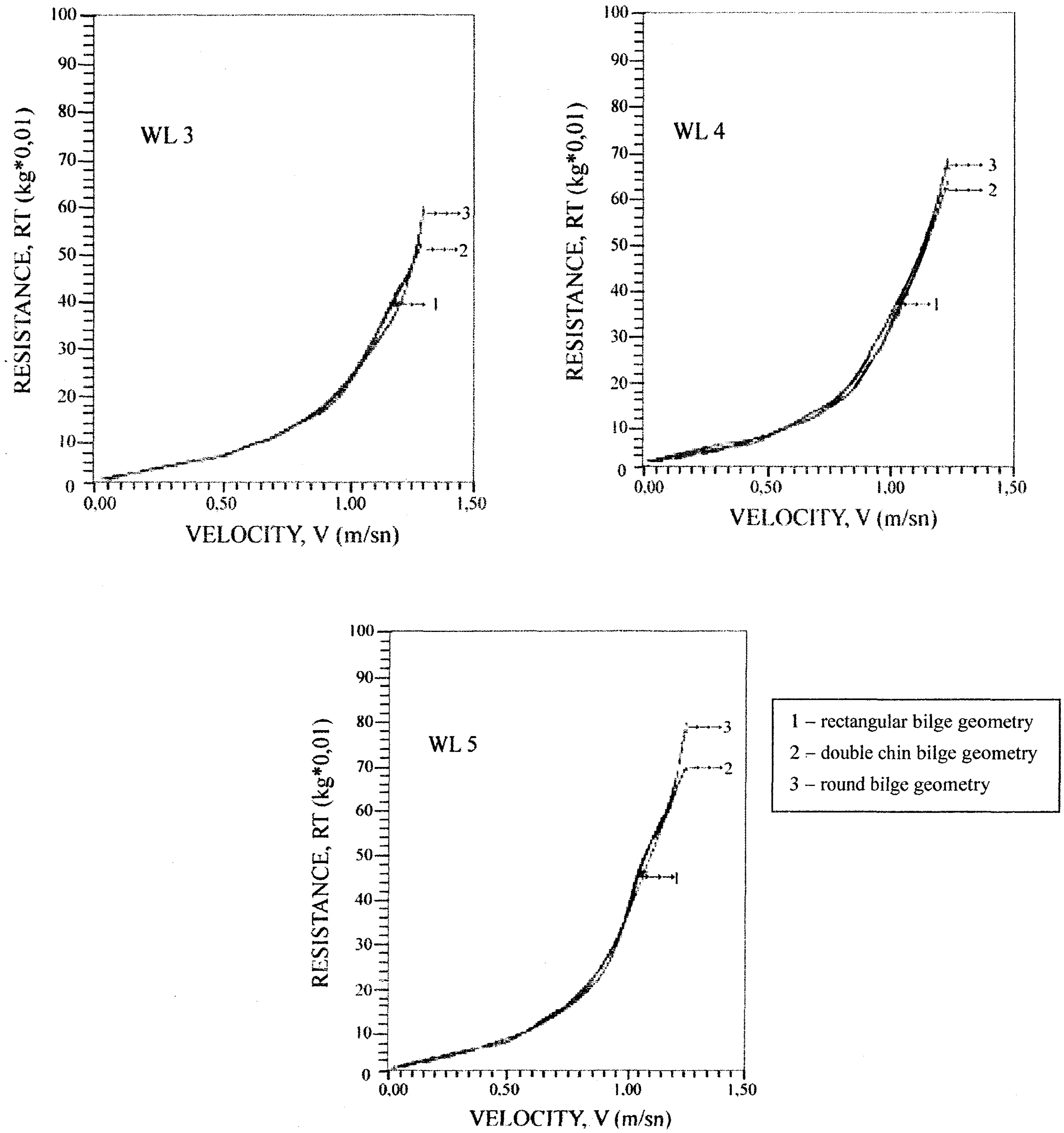


Fig. 1. Model Resistance Characteristics for each bilge geometry

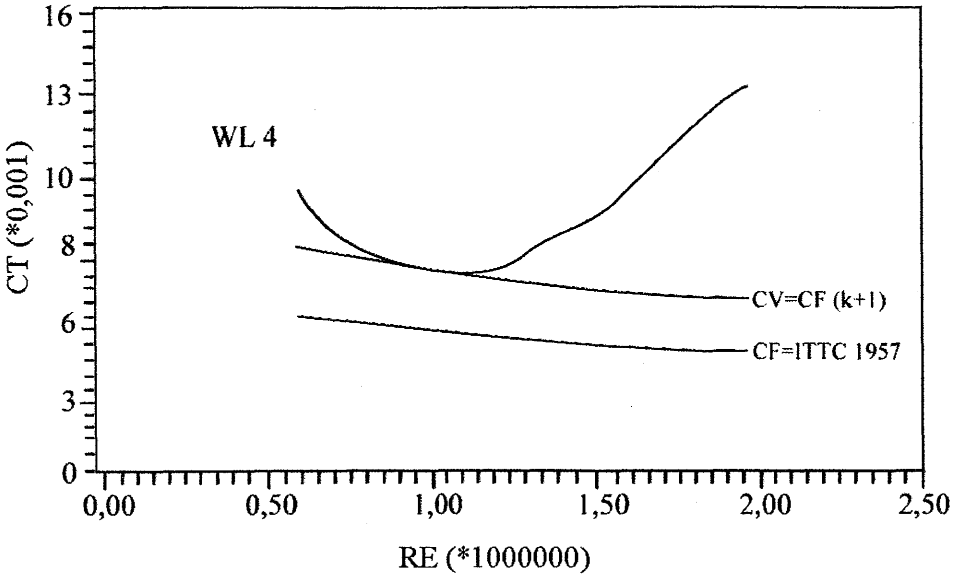


Fig. 2. Double chin bilge resistance coefficient curve for WL4

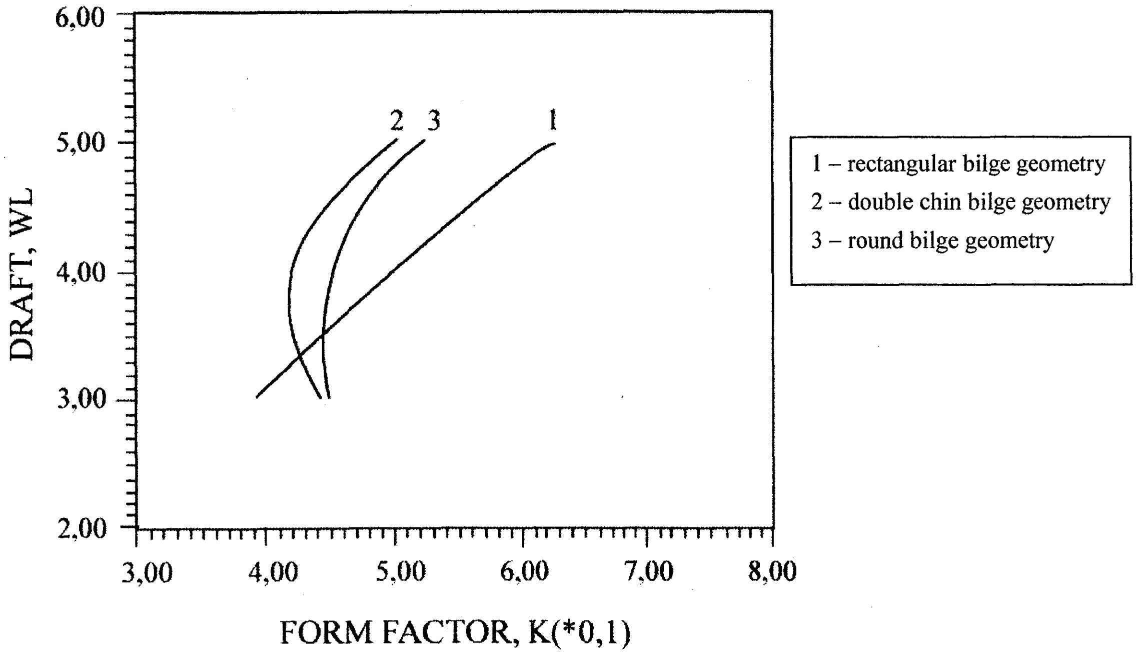


Fig. 3. Form Factor change according to draft for each bilge geometry

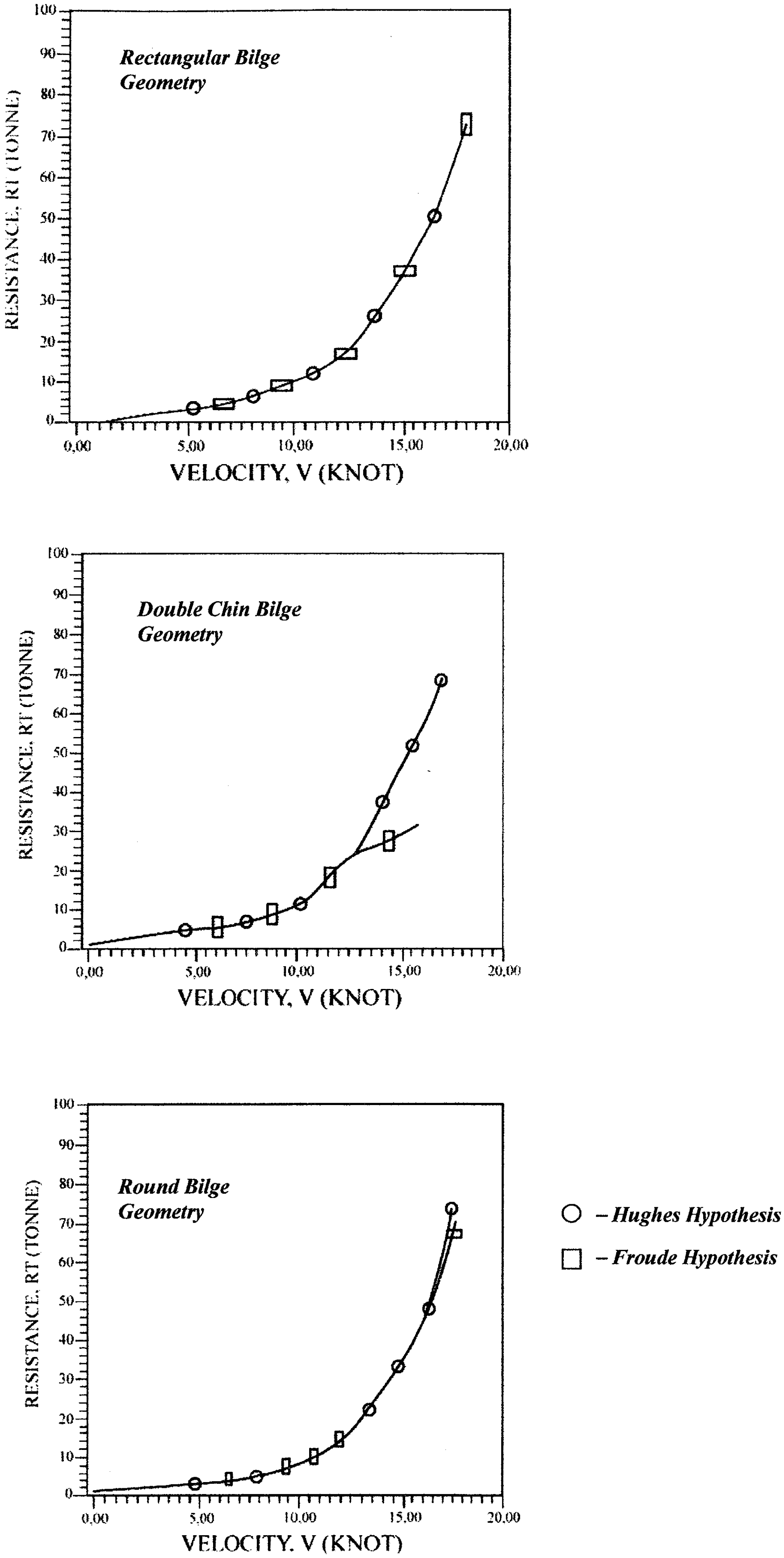


Fig. 4. Prototype resistance of WL4 for each bilge geometry, rectangular, double chin and round respectively

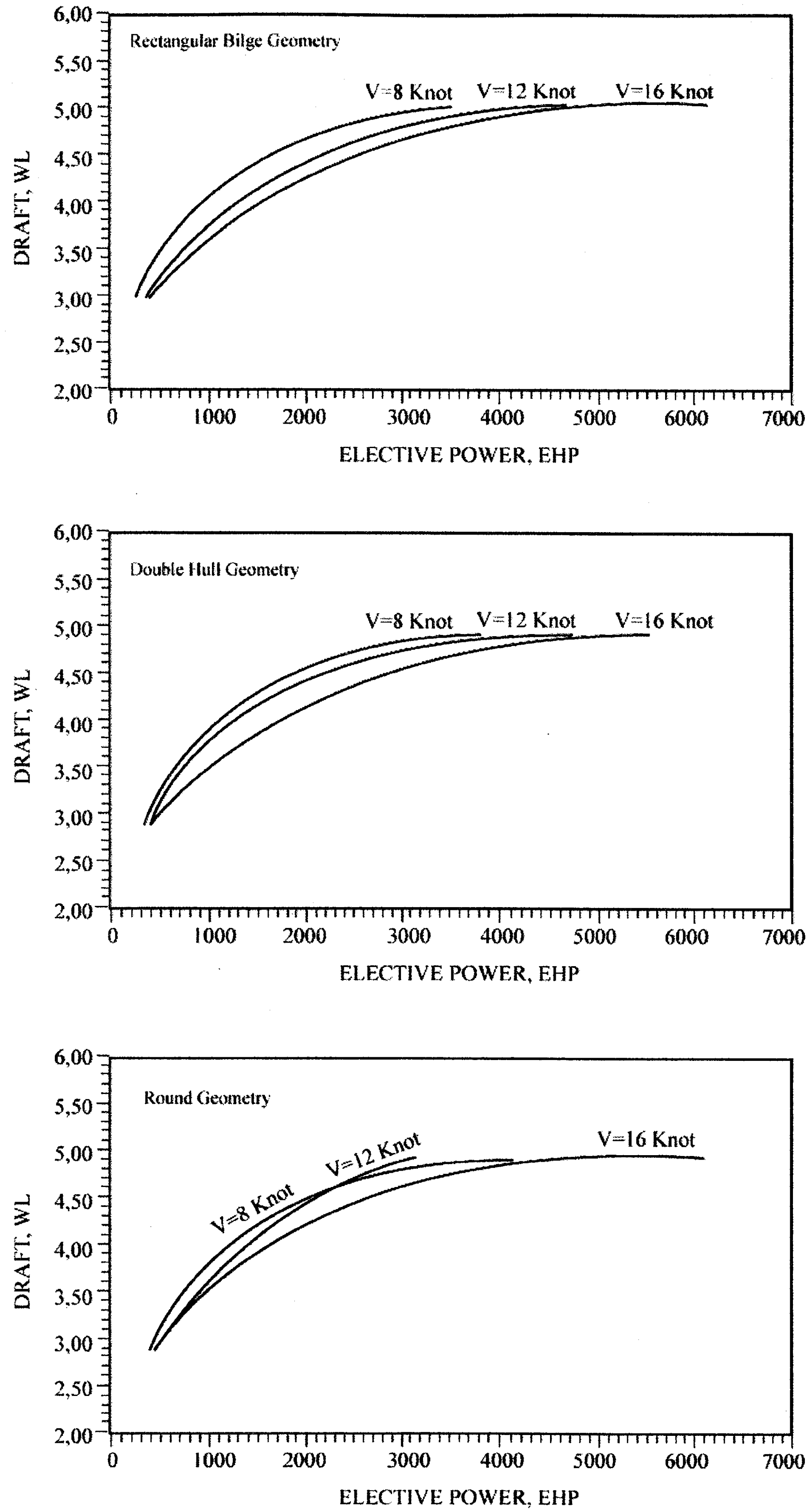


Fig. 5. Draft-Power Characteristics for each bilge geometry

4. CONCLUSION

In literature various ways are introduced to reduce the resistance in ships. In this study the bilge geometry which is one of the key element for the cross section geometry of ship is investigated to understand its effects on ship resistance. The results are presented. It is seen that bilge geometry is directly effect the resistance of the ship. In this context bilge geometry is also directly effect the ship operations by reducing the operational costs.

ACKNOWLEDGEMENT

We would like to a special thank to Ms. Pelin Yilmaz who is Phd Candidate in Shanghai Maritime University and research assistant in Istanbul Technical University Maritime Faculty, for her endeavours in this study.

References

[1] Kafalı, K., Static and Dynamic Principles of Ship Forms. Vol.2 (Ship Resistance and Propulsion) Istanbul, 1975.

[2] Kafalı, K.The Design of Ships, Istanbul, 1988.

[3] M. Comstock, Principles of Naval Architecture, SNAME, New York, 1974.

EVOLUTION IN MARITIME LABOR LAW REMARKS ON MARITIME LABOR CONVENTION 2006

Onur Sabri Durak,
PhD, Candidate
Istanbul Technical University
Maritime Faculty Research Assistant.
E-mail: duraks@itu.edu.tr

Abstract. Albeit the evolution and development in naval architecture and naval technology in shipping industry, yet the competent officers and seamen are essential components for shipping business and industry to carry out voyages on sea-going vessels. Despite the importance of competent officers and seamen is a well known topic in shipping industry, difficulties of maritime labour comparatively to other labour industries, are obstacles for maritime employees. To clear and to reduce these obstacles in maritime labour, international organizations like as United Nations (UN), International Maritime Organization (IMO), International Labour Organization (ILO) performed workshops and promulgated many conventions related with maritime labour and seafarers' rights, particularly conditions of employment. Even though all those workshops provide legal improvements for maritime employees workings on board, and there is a consensus between all States to provide framework for better living and working conditions for maritime employees, those obstacles yet cannot be solved clearly. The main matters for aforecited conventions are namely; some of these conventions are not approved or enacted by member States, so are not capable to be enforced, latter the disharmony between all those conventions. Necessities and requirements to draft a consolidated convention concluded Maritime Labour Convention 2006. This paper aims to point out and remark modifications of conditions of employement under international maritime labour law in a comprehensive legal methoodology, among related former maritime labour conventions, recommendations with consolidated Maritime Labour Convention 2006, and to address conclusion remarks on enforcement of Maritime Labour Convention on the eve of entering into force.

1. INTRODUCTION

"No man will be a sailor who has contrivance enough to get himself into a jail; for being in a ship is being in a jail, with the chance of being drowned.
A man in a jail has more room, beter food, and commonly beter company."
Dr. Samuel Johnson

Shipping industry comprises many parties particularly, shipowners, ship management comapanies, ship operators, port operators, port agencies, seafarers, seafarer suppliers etc. (Akdoğan, 1988; Kender & Çetingil, 2007). Even though all aforecited parties are crucial for shipping industry and maritime affairs, particularly for today, shipping industry cannot be thought without competent seafarers.

Working and living on board a ship has the same meaning with, dangers and threats of sea, loneliness, isolation and restriction. Beside all these matters, seafarers were and still in many circumstances are not available to reach any legal protection (Fitzpatrick & Anderson, 2005). Even though shipping was specially regulated from ancient times to modern period not many matters were regulated related to seafarers and their rights among those codifications (Çağa & Kender, 2000; Tekil, 2001).

Seafarers' isolation was not limited with physical conditions of ship, this means, legal systems ended at the edge of the territority they served such as, lakes, rivers, inland waters and at most territorial sea of the State (Shaw QC, 2003). On high seas, ship and the seafarers are out of the coverage of laws and jurisdiction authority. On the other side, particularly, leading shipping countries met complaints and claims of seafarers from mediveal age to industrialization periods. Due to these complaints and claims, governments take actions and measures to provide legal framework and improve living and working conditions for seafarers on board (Christodolou-Varotsi & Pentsov, 2008). To provide legal frameworks and improve the conditions of working and living on board, States take first steps at national levels. At first instance national level legislations particularly provided so-called private law concerns and were set up on contract relations between shipowners/charterers and seafarers. Latter, due respect to the public considerations, the matters were regulated at international level under authority of international organizations such as ILO and IMO and combined with public law (Mukherjee, 2002).

Here in this study, in second chapter evolution of seafarers' rights, relavant maritime labour conventions will be shortly examined. Third chapter will focus on Maritime Labour Convention, 2006 and will introduce fundamentals of aforecited Convention. The coming fourth chapter will particularly introduce the conditions of employment in Maritime Labour Convention, 2006 under eight sub-chapters. In this chapter, conditions of employment will be examined in a comprehensive legal methodology and Maritime Labour Convetion will be compared to former maritime labour legislations such as conventions and recommendations. The fifth, last, chapter addresses the conclusion remarks.

2. SEAFARERS' RIGHTS

Albeit the evolution and development in naval architecture and naval technology in shipping industry, yet the competent officers and seamen are essential components for shipping business and industry to carry out voyages on sea-going vessels. After a ship has been acquired and matters relating to her ownership and other proprietary interests and registration process have been dealt with, the ship has to be crewed, manned and made ready for the service.

When a ship has been ready for the service, working and living conditions of seafarers on board a ship should be humanitarian. Seafarers on board a ship have more difficulties rather than employees on ashore, due to these difficulties, decent and suitable working and living conditions should be provided for seafarers on board a ship. However, seafarers, as the crucial element of ship manning, and their rights, conditions of living and working have not been explicitly regulated and protected till the 19th century at national levels and 20th century at international levels (Fitzpatrick & Anderson, 2005).

At first instance, due respect to complaints and claims of seafarers, leading shipping countries and industralized countries such as Great Britain etc. took the first steps to regulate acts, codes, regulations etc. to provide legal framework for seafarers and to protect seafarers' rights. The British Parliament considered the situation of seafarers and adopted relavant chapters in the British Merchant Act 1850. The British Merchant Shipping Act 1850 addressed the issues of safety, lifeboats, safety in navigation, structural integrity and etc. Aforecited Act was aimed at raising the levels and improving the conditions of masters, officers and seafarers (http://www.mariners-l.co.uk/UKLogs,CrewLists.html, last visit on 23th May, 2009). All over the world, States took steps, codified law, acts, regulations related to maritime labour law, seafarers' rights, working and living conditions on board a ship. Developed countries, countries engaged to international trade and shipping industry, labour supplying countries all considered the conditions of seafarers on board. States took action to regulate seafarers' rights due respect to their national legal systems, such as, some of the States regulated maritime labour matters in an independant maritime labour acts or laws such as Turkish Maritime Labour Code (Ataergin & Caner, 2004; Maritime Labour Code), some of the States regulated these matters in general principles of labour law such as Labour Contract Code of the People's Republic of China (Mo, 1999; for further informations, amendments and adoptions of codes see Maritime Code of the People's Republic of China and Labor Contract Code of the People's Republic of China), some states regulated these matters in a combination of contract law and labour law etc.

Steam power started to be used on ships late 19th century and after steam power has been used on ships, international trade spreaded to global world. This also concluded another matter related to maritime labour; crews included more seafarers from China, India, Africa, Somalia, South East Countries and

Central America on board a ship. In accordance with this situation global and more complex matters related to maritime labour took place on board (Fitzpatric & Anderson, 2005).

In 1898, transportation workers formed their international organization, the International Transport Workers' Federation (ITF) and similar to transportation workers, in 1908, the shipowners formed their international organization, the International Shipping Federation (ISF), and in 1919 the International Labour Organization was established. From then on, ILO drafted 47 Conventions (http://www.ilo.org/ilolex/english/convdisp1.htm, last visit 23[th] May, 2009) and 33 Recommendations (http://www.ilo.org/ilolex/english/recdisp1.htm, last visit on 23[th] May, 2009) relating to maritime labour matters, seafarers' rights (including Fishermen). Aforecited legal instruments promulgated by ILO, covers international standards for maritime labour matters including particularly: right to life; freedom from forced labour; freedom from torture, cruel, inhuman or degrading treatment; freedom from discrimination; child labour; right to a legal remedy and access to justice; freedom of association and the right to collective bargaining; right to strike; right to employment agreement; right to free employment services and continuity of employment; right to identification documents and shore leave; right to safe and healthy working conditions; right to fair wages; right to fair treatment; right to reasonable working hours, rest and holidays; right to health and medical care; right to social security and welfare; right to repatriation.

Beside ILO legal instruments, UN, IMO introduced legal instruments to protect seafarers' rights and improve the level of maritime labour conditions. As humanbeings, seafarers should benefit main human rights promulgated by UN Conventions particularly: International Convenant on Economic, Social and Cultural Rights, 1966 (CESCR); International Convenant on Civil and Political Rights, 1966 (CCPR) and Protocols thereto; International Convention on the Elimination of All Forms of Racial Discrimination, 1965 (CERD); Convention on the Elimination of All Forms of Discrimination Against Women, 1979 (CEDAW) and Protocol thereto; Convention Against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment, 1984 (CAT) and Protocol thereto; and Convention on the Rights of the Child, 1989 (CRC) and Protocols thereto. IMO considered seafarers' rights as a human-element of maritime affairs and promulgated relavant legal instruments to provide safe and secure ship manning, particularly: the International Convention for the Safety of Life at Sea, 1974 (SOLAS) and Protocols thereto; the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 (STCW); and the International Management Code for the Safe Operation of Ships and for Pollution Prevention, 1993 (ISM Code) etc. (Ataergin & Caner, 2006). IMO Conventions' concept is particularly different from ILO legal instruments and human righhts treaties etc. While ILO Conventions and human rights treaties intend to create rights for individuals, IMO legal instruments do not intend to create rights for individuals. IMO legal instruments particularly impose obligations on States which have the effect of creating benefits, rather than rights, for seafarers (Mukherjee, 2002; Gold & Kindred, 2003; Fitzpatrick & Anderson, 2005). After briefly introducing legal instruments relating to maritime labour matters, in the coming chapter, consolidated Maritime Labour Convention, 2006 will be shortly introduced.

3. AN OVERVIEW OF MARITIME LABOUR CONVENTION, 2006

Legal instruments drafted by international organizations concerned with maritime labour matters and seafarers' rights exists in many different conventions, regulations and circulars. Even though, maritime labour matters and seafarers' rights were and are regulated and drafted, generally shipping industry, particularly seafarers still meet many diffculties. Main reason for these difficulties is mainly legal position of seafarers: absence of global accepted and readily enforceable regulatory regime; very uncertain and often vulnerable circumstances for seafarers; unacceptable working and living conditions; overlapping and sometimes conflicting rules, complex technical enforcement procedures; combinations of contracts involving several different parties. Beside aforecited matters, shipowners on certain easy flags and some single ship-owners enjoy the legal ambiguity among these legal instruments and find easy to evade their obligations to seafarers. Following to aforecited matters, some other reasons required changes for international maritime labour legislations such as: extensive structural change in the shipping industry, particularly in the last 25 years; emergence of the world's first genuinely global industry and workforce; changes in ownership, financing and the rise of ship management companies resulting in significant shifts in the labour market for seafarers; development of composed mixed nationality crews in highly organized global network linking shipowners, ship managers, labour supplying agencies and training institutions; many of the existing legal instruments and labour standards need to be updated; low ratification rate for some of the key Conventions; high level of detail combined with the large number of Conventions led to problems for inspections and enforcement; a need to provide level playing field and avoid exploitation of workers; increased stress and complexity in the maritime work place has an impact on the health and social security of workers; and the expensive and long process of updating ILO maritime conventions need to be revised.

Due respect to the these considerations, ILO developed a legal instrument which brings together into a consolidated text as much of the existing ILO legal instruments as it proves possible to achieve. The new consolidated Maritime Labour Convention, 2006 intend to be globally applicable, easily understandable, readily updatable and uniformly enforced. Maritime Labour Convention, 2006 consolidated and revised all ILO maritime labour instruments (conventions and regulations), except the Seafarers' Pension Convention, 1946 and the Seafarer's Identity Documents Convention, 1958 in to a single super convention. Maritime Labour Convention, 2006, sets out seafarers' rights to decent working and living conditions on board. Consolidated Maritime Labour Convention, 2006 will be the new pillar of the international uniform regulatory regime complementing SOLAS, STCW, ISM and MARPOL.

The consolidated Maritime Labour Convention, 2006 comprises three parts: the Articles, the Regulations and the Code. The Articles and the Regulations set out the core rights, principles and also basic obligations of Members ratifying the Convention. The Code prescribes the details for the implementation of the Regulations. It comprises Part A (mandatory Standards) and Part B (non-mandatory Guidelines).

The Regulations and the Code, which includes Standards (mandatory) and Guidelines (non-mandatory), are drafted under five Titles: Title 1 "Minimum requirements for seafarers" including requirements of minimum age, medical certificate, training and qualifications, recruitment and placement; Title 2 "Conditions of employment" including requirements of employment agreements, wages, hours of work and rest, entitlement to leave, repatriation, seafarers' compensation for the ship's loss or foundering, manning levels, career and skill development and opportunities for seafarers' employment; Title 3 "Accomodation, recreational facilities, food and catering" including requirements of accomodation, recreational facilities, food and catering; Title 4 "Health protection, medical care, welfare and social security protection" including requirements of medical care on board ship and ashore, shipowener's liability, health and safety protection and accident prevention, access to shore-based welfare facilities, social security; Title 5 "Compliance and enforcement" prescribes flag State responsibilities, port State responsibilities, labour supplying responsibilities.

For this study, in fourth chapter, Title 2 "Conditions of employment" will be examiend and discussed in a comprehensive legal methodology.

4. CONDITIONS OF EMPLOYMENT IN MARITIME LABOUR CONVENTION 2006

4.1. Seafarers' employment agreements

In accordance with MLC, 2006 Standard A2.1, each Member shall adopt laws or regulations requiring that ships that fly its flag comply with the following requirements: (a) seafarers working on ships that fly its flag shall have a seafarers' employment agreement signed by both the seafarer and the shipowner or a representative of the shipowner (or where they are not employees, evidence of contractual or similar arrangements) providing them with decent working and living conditions on board the ship as required by this Convention; (b) seafarers signing seafarers' employment agreement shall be given an opportunity to examine and seek advice on the agreement before signing, as well as such other facilities as are necessary to ensure that they have freely entered into an agreement with a sufficient understanding of their rights and responsibilities; (c) the shipowner and seafarer concerned shall each have a signed original of the seafarer's employment agreement; (d) measures shall be taken to ensure that clear information as to the conditions of their employment can be easily obtained on board by seafarers, including the ship's master, and that such information, including a copy of the seafarer' employment agreement, is also accessible for review by officers of a competent authority, including those in ports to be visited; and (e) seafarers shall be given a document containing a record of their employment on board the ship (MLC, 2006, Standard A2.1, paragraph 1).

MLC, 2006, Standard A2.1, paragraph 4 prescribes that, each Member shall adopt laws and regulations specifying the matters that are to be included in all seafarers' employment agreements governed by its national law. These seafares' employment agreements shall in all cases contain the following particulars: (a) the seafarer's full name, date of birth or age, and birthplace; (b) the shipowner's name and address; (c) the place where and date when the seafarers' employment agreement is entered into; (d) the capacity in which the seafarer is to be employed; (e) the amount of seafarer's wages or, where applicable, the formula used for calculating them; (f) the amount of paid annual leave or, where applicable, the formula used for calculating it; (g) the termination of the agreement and the conditions thereof, including (i) if the agreement has been made for an indefinite period, which shall not be less for the shipowner than for the seafarer; (ii) if the agreement has been made for a definite period, the date fixed for its expiry; and (iii) if the agreement has been made for a voyage, the port of destination and time which has to expire after arrival before the seafarer should be discharged; (h) the health and social security protection benefits to be provided to the seafarer by the shipowner; (i) the seafarer's entitlement to repatriation; (j) reference to the collective bargaining agreement, if applicable; and (k) any other particulars which national law may require.

In this subchapter, changes which are prescribed by MLC, 2006 into the relevant former Convention's existing standards, as regulated by the "Seamen's Articles of Agreement Convention, 1926, No. 22 (http://www.ilo.org/ilolex/english/convdisp1.htm) will be addressed. First of all, MLC, 2006 in accordance with Standard A2.1, paragraphs 1 (a), (e) prescribe an explicit requirement for the ratifying Members that all seafarers working on ships flying their flags shall have a seafarers' employment agreement whereas Convention No. 22 did not have such an explicit requirement. Second, MLC, 2006 in accordance with Standard A2.1, paragraph 1(d) prescribes that clear information as to the conditions of employment, including a copy of the seafarers' employment agreement can be easily obtained on board by seafarers and is also accessible for review by officers of a competent authority, including those in ports to be visited whereas former Convention did not have any such requirement. Third, MLC, 2006, in accordance with Standard A2.1, paragraph 2 requires that, where the language of the seafarers' employment agreement and applicable collective bargaining is not in English, a copy of a Standard form of the agreement and the portions of collective bargaining agreement that are subject to a port State inspection shall be available in English (except for ships engaged only in domestic voyages), whereas former Convention did not have any such requirement. Fourth, MLC, 2006, in accordance with Standard A2.1, paragraphs 4(h), 4(i), 4(j), added the health and social security protection benefits to be provided to the seafarer by the shipowner, the seafarer's entitlement to repatriation and reference to the collective bargaining agreement (if applicable) items to the list of particulars to be included into seafarers' employment agreements. Fifth, MLC, 2006, in accordance with Standard A2.1, paragraph 5, requires that, the duration of the minimum period of notice for the early termination of a sefarers' employment agreement shall not be shorter than seven days, whereas under Convention No. 22, Article 9, paragraph 1 the period of notice shall not be less than twenty-four hours. Last of all, while Convention No. 22 in accordance with Article 14, paragraph 2, provides for the right of the seaman to obtain from the master a seperate certificate as to the quality of his work, or a certificate indicating wheter he has fully discharged his obligations under the agreement, MLC, 2006 does not provide any such documents.

4.2. Wages

Under MLC, 2006, in accordance with Standard A2.2, paragraph 1, each Member shall require that payments due to seafarers working on ships that fly its flag are made at no greater than monthly intervals and in accordance with any applicable collective agreement. In accordance with Standard A2.2, paragraphs 3 and 4, each Member shall require that shipowners take measures to provide seafarers with a means of transmitting all or part of their earnings to their families or dependants or legal beneficiaries, including (a) system for enabling seafarers, at the time of their entering employment or during it, to allot, if they so desire, a proportion of their wages for remittance at regular intervals to their families by bank transfers or similar means; and (b) a requirement that allotments should be remitted in due time and directly to the person or persons nominated by the seafarers. In addition to these matters MLC, 2006, Guideline B2.2, contains recommendations due respect to the "calculation and payment" of wages (in accordance with Guideline B2.2.2), "minimum wages" (in accordance with Guideline B2.2.3) and "minimum monthly basic pay of wage figure for able seafarers" (in accordance with Guideline B2.2.4).

The periodicty of payment of wages has been prescribed with in the Seafarers' Wages, Hours of Work and the Manning of the Ships Recommendation, No. 187 in accordance with section 6(d) (http://www.ilo.org/ilolex/english/recdisp1.htm) and the transfer of earnings to the families has been prescribed with in the Seamen's Welfare in Ports Recommendation, No. 48, in accordance with section 10(b) (http://www.ilo.org/ilolex/english/recdisp1.htm). MLC, 2006, include these two respective requirements as mandatory standards whereas existing standards related to seafarers' wages were prescribed as recommendations, not as requirements.

4.3. Hours of work and hours of rest

MLC, 2006 Standard A2.3, prescribes the term of hours of work and hours of rest such as: (a) hours of work means time during which seafarers are required to do work on account of the ship; (b) hours of rest means time outside hours of work; this term does not include short breaks (in accordance with Standard A2.3, paragraph 1).

MLC, 2006 Standard A2.3, prescribes the following limits on hours of work or rest: (a) maximum hours of work shall not exceed: (i) 14 hours in any 24 hour period; (ii) 72 hours in any seven day period; or (b) minimum hours of rest shall not be less than: (i) ten hours in any 24 hour period; and (ii) 77 hours in any seven day period (in accordance with Standard A2.3, paragraph 5).

In accordance with Standard A2.3, paragraph 6, hours of rest maybe divided into no more than two periods, one of which shall be at least six hours in length, and the interval between consecutive periods of rest shall not exceed 14 hours.

MLC, 2006, Guideline B2.3.1, provides special articles for young seafarers about hours of work and hours of rest. In accordance with Guideline B2.3.1, at sea and in port the following provisions should apply to all young seafarers under the age of 18: (a) working hours should not exceed eight hours per day and 40 hours per week and overtime should be worked only where unavoidable for safety reasons; (b) sufficient time should be allowed for all meals, and a break of at least one hour for the main meal of the day should be assured; and (c) a 15 minute rest period as soon as possible following each two hours of continuous work should be allowed.

4.4. Entitlement to leave

MLC, 2006, in accordance with Standard A2.4, paragraph 1 prescribes that, each Member shall adopt laws and regulations determining the minimum standards for annual leave for seafarers serving on ships that fly its flag, taking proper account of the special needs of seafarers with respect to such leave. In accordance with paragraph 2, subject to any collective agreement or laws or regulations, providing for appropriate method of calculation that takes account of the special needs of seafarers in this respect, the annual leave with pay entitlement shall be calculated on the basis of a minimum of 2.5 calendar days per month of employment. The manner in which the length of service is calculated shall be determined by the competent authority or through the appropriate machinery in each country. Justified absences from work shall not be considered as annual leave. Standard A2.4, paragraph 3 prescribes that, any agreement to forgo such minimum annual leave with pay, except in cases provided for by the competent authority, shall be prohibited.

MLC, 2006, takes the monthly equivalent of the annual 30 days as the basis and provides for calculation on the basis of a minimum of 2.5 calendar days per month of employment, whereas the Seafarers' Annual Leave with Pay Convention, 1976, No. 146 (http://www.ilo.org /ilolex /english /convdisp1.htm) provides that the leave shall in no case be less than 30 calendar days for one year of service.

4.5. Repatriation

In accordance with MLC, 2006, Standard A2.5, paragraph 1, each Member shall ensure that seafarers on ships flying its flag are entitled to repatriation in the following circumstances: (a) if the seafarers' employment agreement expires while they are abroad; (b) when the seafarers' employment agreement is terminated: (i) by the shipowner; or (ii) by the saefarer for justified reasons; and also (c) when the seafarers are no longer able to carry out their duties under their employment agreement or cannot be expected to carry them out in the specific circumstances.

In accordance with MLC, 2006, Standard A2.5, paragraph 3, each Member shall prohibit shipowners from requiring that seafarers make an advance payment towards the cost of repatriation at the beginning of their employment, and also from recovering the cost of repatriation from the seafarers' wages or other entitlements except where the seafarer has been found, in accordance with national laws or regulations or other measures or applicable collective bargaining agreements, to be in serious default of the seafarer's employment obligations.

Due respect to Standard A2.5, paragraph 5, if a shipowner fails to make arrangements for or to meet the cost of repatriation of seafarers who are entitled to be repatriated: (a) the competent authority of the Member whose flag the ship flies shall arrange for repatriation of the seafarers concerned; if it fails to do so, the State from which the seafarers are to be repatriated or the State of which they are a national may arrange for their repatriation and recover the cost from the Member whose flag the ship flies; (b) costs incurred in repatriating seafarers shall be recoverable from the shipowner by the Member whose flag the ship flies; (c) the expenses of repatriation shall in no case be a charge upon the seafarers, except where the seafarer has been found to be in serious default of the seafarer's employment obligations.

MLC, 2006 has introduced changes comparatively into the existing standards prescribed with in the relavant former Convention, Repatriation of Seafarers Convention (Revised), 1987, No.166 (http://www.ilo.org/ilolex/english/convdisp1.htm). First of all, MLC, 2006 obligates each Member to require that ships that fly its flag provide some form of financial security to ensure that seafarers are duly repatriated in accordance with MLC, 2006, whereas former Convention has no such requirements. Second, MLC, 2006 provides for the entitlement to repatriation only when the seafarers' employment agreement is terminated by the seafarer for justified reasons whereas former Convention prescribes in accordance with Article 2, paragraph 1, among other things for seafarers' entitlement to repatriation upon expiry of the period of notice given in accordance with the provisions of articles of agreement or the seafarer's contract of employment. MLC, 2006 prescribes the costs to be born by the shipowner for the repatriation under non-mandatory Part B of the MLC, 2006 in accordance with Guideline B2.5.1, paragraph 3, whereas former Convention prescribed aforecited details as requirements in accordance with Article 4.

4.6. Seafarer compensation for the ship's loss or foundering

In accordance with MLC, 2006, Standard A2.6, paragraph 1, each Member shall make rules ensuring that, in every case of loss or foundering of any ship, the shipowner shall pay to each seafarer on board an indemnity against unemployment resulting from such loss or foundering. Standard A2.6, paragraph 2 prescribes that, aforecited rules shall be without prejudice to any other rights a seafarer may have under the national law of the Member concerned for losses or injuries arising from a ship's loss or foundering.

Calculation of indemnity against unemployment has been prescribed under Guideline B2.6.1, paragraphs 1 and 2, whereas these matters were introduced in the Unemployment Indemnity (Shipwreck) Convention, 1920, No. 8 (http://www.ilo.org/ilolex/english/convdisp1.htm) in accordance with Article 2 as mandatory.

4.7. Manning levels

In accordance with MLC, 2006, Standard A2.7, paragraph 1, each Member shall require that all ships that fly its flag have a sufficient number of seafarers on board to ensure that ships are operated safely, efficiently and with due regard to security. Every ship shall be manned by a crew that is adequate, in terms of size and qualifications, to ensure the safety and security of the ship and its personnel, under all operating conditions, in accordance with the minimum safe manning document or an equivalent issued by the competent authority, and to comply with the Standards of this Convention. Standard A2.7, paragraph 2 prescribes that, when determining, approving or revising manning levels, the competent authority shall take into account the need to avoid or minimize excessive hours of work to ensure sufficient rest and to limit fatigue, as well as the principles in applicable international instruments, especially those of the International Maritime Organization, on manning levels.

MLC, 2006, Standard A2.7, paragraph 3 has introduced an additional requirement that, the competent authority, when determining manning levels, shall take into account all the requirements within Regulation 3.2 and Standard A3.2 concerning food and catering whereas Seafarers' Hours of Work and the Manning of Ships Convention, 1996, No. 180 (http://www.ilo.org/ilolex/english/convdisp1.htm) did not have any such requirements (in accordance with Article 11).

4.8. Career and skill development and opportunities for seafarers' employment

In accordance with MLC, 2006, Standard A2.8, paragraph 1, each Member shall have national policies to encourage career and skill development and employment opportunities for seafarers, in order to provide the maritime sector with a stable and competent workforce. Aforecited policies shall aim to help seafarers strengthen their competencies, qualifications and employment opportunities. Standard A2.8, paragraph 3 prescribes that, each Member shall, after consulting the shipowners' and seafarers' organizations concerned, establish clear objectives for the vocational guidance, education and training of seafarers whose duties on board ship primarily relate to the safe operation and navigation of the ship, including ongoing training.

While MLC, 2006 addresses the aim of national policies to encourage career skill development and employment opportunities for seafarers and help seafarers strengthen their competencies, qualifications and employment opportunities, Continuity of Employment (Seafarers) Convention, 1976, No. 145 (http://www.ilo.org/ilolex/english/convdisp1.htm) prescribes the aim of the national policies as encouraging all concerned to provide continuous or regular employment for qualified seafarers.

5. CONCLUSION

International organizations, particularly, the UN and its agencies, the ILO and IMO effort to create and protect rights, provide standards for seafarers due respect to the conditions on board a ship. States have signed up aforecited standards, conventions, recommendations etc. and commited to grant protection to seafarers on board a ship against to abuses of their human and labour rights. However, many of the ILO Conventions relating to maritime affairs and seafarers' rights have never entered into force.

In accordance with these considerations, ILO drafted a single super convention, Maritime Labour Convention, 2006, which will replace the existing conventions and recommendations relating to seafarers' rights and maritime affairs. Systematic of the new consolidated Maritime Labour Convention, 2006 provides a practical approach to regulate mandatory Standards and non-mandatory Guidelines both in one text. The new consolidated Maritime Labour Convention, 2006 intends to be globally applicable, easily understandable, readily updatable and uniformly enforced.

Maritime Labour Convention, 2006 comprises five Titles under the Regulations and the Code. Here, in this study, second chapter, conditions of employment, of the Regulations and the Code has been examined. This chapter introduces noteworthy changes into the existing standards, as prescribed in former relavant conventions and recommendations relating to seafarers' rights and maritime affairs, particularly: saefarers' employment agreements, wages, entitlement to leave, repatriation and career and skill development and opportunities for seafarers' employment. Aforcited changes aims to provide improvement for seafarers' rights and intend to be easily enforced globally.

Even though Maritime Labour Convention, 2006 intends to be globally applicable, it has not been yet in force and efficiency of convention depends on leading shipping countries' ratifications. ILO member States' considerations on Maritime Labour Convention will determine the Convention's future. Maritime Labour Convention's first advantage is, convention comprises all matters relating to maritime labour matters and seafarers' rights such in a vertical structure. This structure enable that, member States, ratified the Maritime Labour Convention, provide fundamental rights for seafarers on board a ship in every aspect. Latter, the other advantage is the amendment process of convention. Tacit amendment process of Convention provides to be updated easily and this concludes shorter times to ammend and/or change Convention rather than former conventions relating to maritime labour affairs and seafarers rights for coming situations. Last of all, in accordance with the rules relating to flag State responsibility, port State responsibility, labour suppliying responsibility, enforcement of Convention will provide acceleration to improve standards of maritime labour and set up higher levels for seafarers.

ANNEX I.
INTERNATIONAL LABOUR INSTRUMENTS RELATING TO SEAFARERS AND SEAFARERS' RIGHTS

I. Conventions

Number:	Name and Year
7	Minimum Age (Sea) Convention, 1920.
8	Unemployment Indemnity (Shipwreck) Convention, 1920.
9	Placing of Seamen Convention, 1920.
15	Minimum Age (Trimmers and Stokers) Convention, 1920.
16	Medical Examination of Young Persons (Sea) Convention, 1921.
22	Seamen's Articles of Agreement Convention, 1926.
23	Repatriation of Seamen Convention, 1926.
27	Marking of Weight (Packages Transported by Vessels) Convention, 1929.
53	Officers' Competency Certificates Convention, 1936.
54	Holidays with Pay (Sea) Convention, 1936.
55	Shipowners' Liability (Sick and Injured Seamen) Convention, 1936.
56	Sickness Insurance (Sea) Convention, 1936.
57	Hours ofWork and Manning (Sea) Convention, 1936.
58	Minimum Age (Sea) Convention (Revised), 1936.
68	Food and Catering (Ships' Crew) Convention, 1946.
69	Certification of Ships' Cooks Convention, 1946.
70	Social Security (Seafarers) Convention, 1946.
71	Seafarers' Pensions Convention, 1946.
72	Paid Vacations (Seafarers) Convention, 1946.
73	Medical Examination (Seafarers) Convention, 1946.
74	Certification of Able Seamen Convention, 1946.
75	Accommodation of Crews Convention, 1946.
76	Wages, Hours of Work and Manning (Sea) Convention, 1946.
91	Paid Vacations (Seafarers) Convention (Revised), 1949.
92	Accommodation of Crews Convention (Revised), 1949.
93	Wages, Hours of Work and Manning (Sea) Convention (Revised), 1949.
108	Seafarer's Identity Documents Convention, 1958.
109	Wages, Hours of Work and Manning (Sea) Convention (Revised), 1958.
112	Minimum Age (Fishermen) Convention, 1959.
113	Medical Examination (Fishermen) Convention, 1959.
114	Fishermen's Articles of Agreement Convention, 1959.
125	Fishermen's Competency Certificates Convention, 1966.
126	Accommodation of Crews (Fishermen) Convention, 1966.
133	Accommodation of Crews (Supplementary Provisions) Convention, 1970.
134	Prevention of Accidents (Seafarers) Convention, 1970.
145	Continuity of Employment (Seafarers) Convention, 1976.
146	Seafarers' Annual Leave with Pay Convention, 1976.
147	Merchant Shipping (Minimum Standards) Convention, 1976.
163	Seafarers's Welfare Convention, 1987.
164	Health Protection and Medical Care (Seafarers) Convention, 1987.
165	Social Security (Seafarers) Convention (Revised), 1987.
166	Repatriation of Seafarers Convention (Revised), 1987.
178	Labour Inspection (Seafarers) Convention, 1996.
179	Recruitment and Placement of Seafarers Convention, 1996.
180	Seafarers' Hours of Work and the Manning of Ships Convention, 1996.
185	Seafarers' Identity Documents Convention (Revised), 2003.
	Maritime Labour Convention, 2006 (This Convention does not have a number)

II. Recommendations

Number:	Name and Year
7	Hours of Work (Fishing) Recommendation, 1920.
9	National Seamen's Codes Recommendation, 1920.
10	Unemployment Insurance (Seamen) Recommendation, 1920.
26	Migration (Protection of Females at Sea) Recommendation, 1920.
27	Repatriation (Ship Masters and Apprentices) Recommendation, 1926.
28	Labour Inspection (Seamen) Recommendation, 1926.
48	Seamen's Welfare in Ports Recommendation, 1936.
49	Hours of Work and Manning (Sea) Recommendation, 1936.
75	Seafarers' Social Security (Agreements) Recommendation, 1946.
76	Seafarers' (Medical Care for Dependants) Recommendation, 1946.
77	Vocational Training (Seafarers) Recommendations, 1946.
78	Bedding, Mess Utensils and Miscellaneous Provisions (Ships'Crews) Recommendation, 1946.
105	Ships' Medicine Chests Recommendation, 1958.
106	Medical Advice at Sea Recommendation, 1958.
107	Seafarers' Engagement (Foreign Vessels) Recommendation, 1958.
108	Social Conditions and Safety (Seafarers) Recommendation, 1958,
109	Wages, Hours of Work and Manning (Sea) Recommendation, 1958.
126	Vocational Training (Fishermen) Recommendation, 1966.
137	Vocational Training (Seafarers) Recommendation,1970.
138	Seafarers' Welfare Recommendation, 1970.
139	Employment of Seafarers (Technical Developments) Recommendation, 1970
140	Crew Accommodation (Air Conditioning) Recommendation, 1970.
141	Crew Accomodation (Noise Control) Recommendation, 1970.
142	Prevention of Accidents (Seafarers) Recommendation, 1970.
153	Protection of Young Seafarers Recommendation, 1976.
154	Continuity of Employment (Seafarers) Recommendation, 1976.
155	Merchant Shipping (Improvement of Standards) Recommendation, 1976.
173	Seafarers' Welfare Recommendation, 1987.
174	Repatriation of Seafarers Recommendation, 1987.
185	Labour Inspection (Seafarers) Recommendation, 1996.
186	Recruitment and Placement of Seafarers Recommendation, 1996.
187	Seafarers' Wages, Hours of Work and the Manning of Ships Recommendation, 1996.

ANNEX II.
OTHER ONTERNATIONAL LABOUR INSTRUMENTS (APPLICABLE TO MARITIME AFFAIRS)

I. Conventions

Number:	Name and Year
1	Hours of Work (Industry) Convention, 1919.
14	Weekly Rest (Industry) Convention, 1921.
29	Forced Labour Convention, 1930.
30	Hours of Work (Commerce and Offices) Convention, 1930.
81	Labour Inspection Convention, 1947.
87	Freedom of Association and Protection of Right to Organize Convention, 1948.
88	Employment Service Convention, 1948.
94	Labour Clauses (Public Contracts) Convention, 1949.
95	Protection of Wages Convention, 1949.
96	Fee-Charging Employment Agencies Convention (Revised), 1949.
98	Right to Organize and Collective Bargaining Convention, 1949.
100	Equal Remuneration Convention, 1951.
102	Social Security (Minimum Standards) Convention, 1952.
103	Maternity Protection Convention (Revised), 1952.
105	Abolition of Forced Labour Convention, 1957.
106	Weekly Rest (Commerce and Offices) Convention, 1957.
111	Discrimination (Employment and Ocuupation) Convention, 1958.
115	Radiation Protection Convention, 1960.
118	Equality of Treatment (Social Security) Convention, 1962.
119	Guarding of Machinery Convention, 1963.
121	Employment Injury Benefits Convention, 1964 (Schedule I amended in 1980).
127	Maximum Weight Convention, 1967.
128	Invalidity, Old-Age and Survivors' Benefits Convention, 1967.
130	Medical Care and Sickness Benefits Convention, 1969.
131	Miinimum Wage Fixing Convention, 1970.
132	Holidays with Pay Convention (Revised), 1970.
135	Workers' Representatives Convention, 1971.
136	Benzene Convention, 1971.
137	Dock Work Convention, 1973.
138	Minimum Age Convention, 1973.
139	Occupational Cancer Convention, 1974.
144	Tripartite Consultation (International Labour Standards) Convention, 1976.
148	Working Environment (Air Pollution, Noise and Vibration) Convention, 1977.
152	Occupational Safety and Health (Dock Work) Convention, 1979.
155	Occupational Safety and Health Convention, 1981.
157	Maintenance of Social Security Rights Convention, 1982.
158	Termination of Employment Convention, 1982.
162	Asbestos Convention, 1986.
168	Employment Promotion and Protection against Unemployment Convention, 1988.
170	Chemicals Convention, 1990.
173	Protection of Workers' Claims (Employer's Insolvency) Convention, 1992.
174	Prevention of major Industrial Accidents Convention, 1993.
181	Private Employment Agencies Convention, 1997.
183	Maternity Protection Convention, 2000.
187	Promotional Framework for Occupational Safety and Health Convention, 2006.

II. Recommendations

No:	Name and Year
8	Hours of Work (Inland Navigation) Recommendation, 1920.
81	Labour Inspection Recommendation, 1947.
82	Labour Inspection (Mining and Transport) Recommendation, 1947.
114	Radiation Protection, Recommendation, 1960.
116	Reduction of Hours of Work Recommendation, 1962.
118	Guarding of Machinery Recommendation, 1963.
128	Maximum Weight Recommendation, 1967.
144	Benzene Recommendation, 1971.
145	Dock Work Recommendation, 1973.
146	Minimum Age Recommendation, 1973.
147	Occupational Cancer Recommendation, 1974.
150	Human Resources Development Recommendation, 1975.
152	Tripartite Consultation (Activities of the International Labour Organization) Recommendation, 1976.
156	Working Environment (Air Pollution, Noise and Vivration) Recommendation, 1977.
160	Occupational Safety and Health (Dock Work) Recommendation, 1979.
164	Occupational Safety and Health Recommendation, 1981.
167	Maintenance of Social Security Rights Recommendation, 1983.
172	Asbestos Recommendation, 1986.
177	Chemical Recommendation, 1990.
180	Protection of Workers' Claims (Employer's Insolvency) Recommendation, 1992.
181	Prevention of Major Industrial Accidents Recomendation, 1993.
188	Private Employment Agencies Recommendation, 1997.
191	Maternity Protection Recommendation, 2000.
194	List of Occupational Diseases Recommendation, 2002.
195	Human Resources Development Recommendation, 2004.
197	Promotional Framework for Occupational Safety and Health Recommendation, 2006.
198	Employment Relationship Recommendation, 2006.

References

[1] Akdoğan, R.; Deniz Ticareti, Zihni Publications, Istanbul, Turkey, 1988 (In Turkish).

[2] Ataergin, S., Caner, A.; Turkish Maritime Legislation, Beta Publications, Istanbul, Turkey, Volume I, 2004 (In Turkish).

[3] Ataergin, S., Caner, A.; Turkish Maritime Legislation, Beta Publications, Istanbul, Turkey,Volume II, 2006 (In Turkish).

[4] Christodoulou-Varotsi, I., Pentsov, D.A.; Maritime Work Law Fundamentals: Responsible Shipowners, Reliable Seafarers, Springer, Verlag Berlin Heidelberg, 2008.

[5] Çağa, T., Kender, R.; Maritime Law, Beta Publications, Istanbul, Turkey, V.I. (Introduction, Ship, Shipowner, Master), 2000 (In Turkish).

[6] Fitzpatrick, D., Anderson, M.; Seafarers' Rights, Oxford University Pres, Great Britain, 2005.

[7] Gold, E., Chircop, A., Kindred, H.; Essentials of Canadian Law: Maritime Law, Irwin Law Inc., Toronto, Ontario, 2003.

[8] Kender, R., Çetingil E.; Maritime Law, Fundamental Informations, Arıkan Publications, Istanbul, Turkey, 2007 (In Turkish).

[9] Mo, J. S.; Shipping Law in China, Sweet & Maxwell, Hong Kong, 1999.

[10] Mukherjee, P. K.; Maritime Legislation, World Maritime University Publications, Malmö, Sweeden, 2002.

[11] Shaw QC, M. N.; International Law, Cambridge University Pres, Cambridge, United Kingdom, 2003.

[12] Tekil, F.; Maritime Law, Alkım Publications, Istanbul, Turkey, 2001 (In Turkish).

[13] Labor Contract Code of the People's Republic of China (Chinese/English).

[14] Maritime Code of the People's Republic of China (Chinese/English).

[15] Maritime Labour Code (Turkish).

[16] The British Merchant Shipping Act 1850.

[17] http://www.ilo.org/ilolex/english/convdisp1.htm.

[18] http://www.ilo.org/ilolex/english/recdisp1.htm.

[19] http://www.mariners-l.co.uk/UKLogs,CrewLists.html.

TRAINING OF SEAFARERS IN ACCORDANCE WITH REQUIREMENTS OF THE INTERNATIONAL LABOUR ORGANIZATION

Elena A. Lavrentieva,
Doctor of Economical Science, Professor
Vice-President Admiral Makarov State Maritime Academy
E-mail: e_lavrentieva@mail.ru

Abstract. This presentation outlines problems of training of seafarers' in accordance with the accepted international requirements. The ILO requirements for the maritime industry were summed up and the need to factor these requirements in the training process was identified. General principles for training in social and labour spheres were proposed.

Seamanship is a global industry, the work of seafarers is associated with high risks and requires special training and protection. The United Nations Organisation (UN), the International Maritime Organisation (IMO), the International Labour Organisation (ILO) are responsible for setting up a legal framework for requirements to training of maritime specialists, which is fundamentally different from other spheres as it is inherently connected to the international market of transportation services and the ship-owners are obliged to fulfil national as well as international rules.

Training has a special importance because of the shortage of qualified personnel in the maritime business. According to different estimates, there is a 4% shortage of maritime officers in the world. The same is true for Russia as a whole, as well as for the North-West Region of Russia. One of the reasons is the decline in the status of the seafarer as a profession. Young people in Europe are not eager to get out to sea. The labour market is shifting towards the East where labour is not only cheaper but also more specialised. China is becoming very active in the maritime labour market supplying 5000 newly graduated officers of the trade fleet annually, whereas Russia graduates only 1000 a year. The Russian fleet is lacking senior command staff, yet over 26000 Russian sailors get employed by foreign shipping lines every year. The staffing issues of the Russian fleet have been discussed at the government level and the meetings of the Marine Collegium.

The strategic policy papers on the development of the Russian maritime industry emphasise that the national maritime policy goals can only be achieved if adequate human resources are available, both on the level of management and the level of implementation. Therefore, priority is given to improving the system responsible for engagement and training of young people. This means that a conducive environment should be created to preserve and attract qualified personnel, preserve and further develop the educational system in the maritime sphere, create a management training system for the government sector, including the maritime industry, strengthen the maritime traditions of Russia, ensure government support to the maintenance and operation of training vessels and the training infrastructure of maritime schools. Moreover, government support is essential to the training institutions and organisations that are responsible for implementing Russia's international obligations in training and navigation safety.

Investments in training and retraining of personnel have a long-term benefit that translates into overall growth of production efficiency as a result of better skills of the labour force.

The training and retraining of recognised professionals in the waterborne transport is a prerequisite to successful transport operations. International and national rules and requirements commit ship-owners to provide and monitor a continuous system of training and retraining of senior crew members.

It is necessary to note that compliance with the international and national maritime requirements also requires shore-based administrative personnel on all levels to be engaged in a continuous process of training and retraining which serves as an organic component of the overall human resources policy. In the majority of industries, this training process builds on the internal, national priorities.

The maritime sector differs from others in that it is subject to a wide range of international requirements. These are, in the first place, the conventions, agreements, contracts and other legal instruments which were ratified by Russia. Additionally, the carriage of goods by sea comes within the jurisdiction of various national systems adopted by flag states, port states, etc.

The existing workforce issues are closely related to those encountered in the social sphere, in the world of labour and in the training sector. Governments, educational institutions and ship-owners deal with these issues in accordance with their resources but it is important to emphasize the importance of a systemic approach to training of specialists.

Modern approaches to quality assessment in education put quality at the centre of the educational system, as it reflects whether the achieved educational outcomes conform to the regulatory requirements, as well as social and personal expectations. This approach is viewed as the main principle of the process of education stated in the Priority Areas of the National Educational Policy, which was adopted in the Russian Federation. This approach calls for a number of measures on the level of the government, as well as educational institutions to introduce innovations in training.

Innovations in higher education are transnational by nature and include not only the development and application of the latest achievements in science and technology, but also a reasonable diversification of acquired knowledge.

Professional training in the maritime sphere is an established system, which is regulated by a number of international conventions, as per IMO requirements. Among these conventions are the Convention on Standards of Training and Certification (STCW), the Convention for the Safety of Life at Sea (SOLAS), the Convention on the Prevention of Marine Pollution (MARPOL), etc.

At the same time, social aspects of international requirements for the shipping industry gain even more significance in the current economic climate. And the framework in this sphere is set by the ILO conventions and recommendations.

Social and labour relations in the shipping industry are directly regulated by 40 maritime conventions. Therefore, there is a long list of international instruments that cover a lot of issues concerning seafarers' working and living conditions and free time on board the ship. The ILO member states have ratified, to various degrees, the maritime conventions, and it became imperative to integrate international treaties and to harmonise the standards. This was achieved by adopting the Maritime Labour Convention in 2006.

The consolidated convention integrated 36 separate regulatory documents of the ILO and became the single coordinated legal instrument, which is based on the fundamental principles of the ILO and includes almost all the current labour standards stipulated in maritime conventions and recommendations. This means that the new legal documents can be viewed as a 'forth pillar' of the international legal framework in the maritime industry, in addition to the key IMO conventions (SOLAS 1974, STCW 1978 (1995) and MARPOL 1973/1978). The new convention contains additional requirements for governments, ship-owners and ship personnel and increases the practical role of social agreements on the government, sectoral and company level.

Russian water transport workers traditionally practice collective agreements. There is a general agreement at the government level and tariff agreements for sea and river transport, which lay out minimal social protection standards for the sector. Many enterprises develop and adopt collective agreements. However, there is a certain difference between the Russian and international markets of transportation services. The domestic market is regulated by the Russian labour legislation, whereas international operations are primarily governed by the ILO instruments that Russian has ratified.

The advances of social and labour policy, as well as a steady international trend to tighten control over compliance with the international conventions in the maritime industry make the instruction and understanding of the principal ILO requirements even more important. The knowledge of social and economic processes in the current conditions is in high demand among the employers and the students, so these aspects should be included in the curriculum. The study of social and economic issues is usually associated with national contexts. But many vessels are manned by international crews, and as citizens of different countries seafarers enjoy different levels of social protection, from pay scale to pension fund schemes.

So far professional training and retraining curricula have not been paying enough attention to the provisions of the ILO conventions. But the maritime labour market is becoming international, and requirements are getting more stringent. Whether the flag state ratified the convention or not, compliance with these requirements will be verified. So training should impart knowledge that has practical value. Until recently the responsibility for many issues rested with the master of a ship as a ship-owners' representative. The regulatory authorities held the master responsible for the safety of navigation, safety of cargo, etc. These responsibilities are reflected in guidance documents and duty regulations. However, labour issues were limited to observing the established limitations on hours of work, timely pay and other limited administrative issues. Labour relations and social protection were not part of the master's duties and were usually the task of the ship operator's management. The new convention establishes forms of certification, monitoring and complaint procedures on board the ship, and the master of the ship on behalf of the ship-owner will bear additional responsibility for adhering to these requirements. This entails the need for additional training in social and labour issues for command staff, while maritime school curricula should include additional courses for the in-depth study of these issues. The expanded presence of social and economic issues in the learning curriculum will ensure a certain degree of legal and social protection of newly graduated specialists, who may enjoy this protection as citizens of their country both at work and in everyday life.

The training and retraining curricula for seafarers should include the following issues:

- administrative and legal aspects of seafarers' employment: recruitment, minimum age, minimum medial requirements, service contracts, vacation privileges, staffing requirements, and repatriation;

- professional training requirements for the maritime industry: minimum requirements for the level of training and qualifications, career development, the system of retraining and further professional development;

- working and living conditions, occupational safety and health, working hours, accommodation and rest conditions, catering and food, medical care on board and on shore, safety of work and prevention of accidents;

- social and economic motivation for seafarers: remuneration of labour and incentives, compensation packages, social security;

- administration of control procedures: flag state and port state obligations; grievance procedures.

It is clear that, unlike future economists and managers, seafarers do not need a full spectrum of labour-related and social courses in the curriculum. But a more comprehensive focus on the issues is necessary as it will make it possible:

- to ensure an innovative and comprehensive approach to education and training in line with the modern trend;

– to take into account employers' needs, as well as current international and national requirements in training;

– to make maritime professional training attractive to future and current students.

The comprehensive approach should be reasonably balanced in relation to the acquisition of specialized knowledge and practical skills.

A more comprehensive training of seafarers that includes social and labour issues in accordance with the ILO requirements will ensure that the shipping industry has the so much needed specialists in various professional fields and will contribute to the efficient development and implementation of government and corporate level long-term human resources strategies.

References

[1] The Maritime Labour Convention, ILO, 2006. – 123 p.

[2] The National Educational Policy of the Russian Federation. Order of Ministry of Education and Science of the Russian Federation #201 of 3 August 2006.

[3] The Transportation Strategy of the Russian Federation until 2030. Government Regulation #1734-p of 22 November 2008.

[4] www.expert.ru

[5] www.see news.ru

GRADUATE SKILLS AND WORKPLACE LEARNING ON MARITIME PROGRAMMES AT LJMU

Steve Bonsall,
Dr., Head of Maritime, Transport and Management,
School of Engineering. LJMU.
E-mail: s.bonsall@ljmu.ac.uk

Abstract. In 2007 LJMU developed a university wide initiative to provide all students on courses of 2 academic years or more with the opportunity to gain a graduate skills certificate as well as their final degree. The graduate skills programme or WoW (World of Work) as it is now known, encompasses the seagoing courses as well as the Maritime Business and Logistics programmes. The initiative covers both skills learnt in the classroom as well as those requiring time in workplace activities. The latter requirement is easily accommodated in sea service for those on the seagoing programmes but requires some imaginative input to Maritime Business and Logistics courses.

This paper explores in detail how the two disciplines of Maritime Business and Logistics at LJMU have embraced the need to encompass the WoW initiative and the success they have had in that direction. Lessons learnt and student and employer feedback are also assessed with conclusions drawn. Reference is made to Nautical Science where necessary.

1. INTRODUCTION

The LJMU central university adopted a work-based initiative in the academic year 2006–7. The initiative involved all courses being mapped against a series of 41 graduate skills listed in eight generic areas. Also included was the requirement for courses to ensure that all students had the opportunity to experience work based/ work related learning amounting to 12 credits of study on programmes lasting 2 years or more. This then included the Nautical Science foundation degree plus the honours degrees in Nautical Science; Maritime Business and Transport and Logistics. Each of these degrees already had some elements of work-based learning (WBL) either as a result of the professional accreditation as in the case of Nautical Science or because programme teams had included these elements prior to the WoW (World of Work) initiative as in the case of maritime business and transport and logistics. In the case of Maritime Business the work-based learning was increased as the existing provision did not reach the 12 credit minimum requirement.

2. LITERATURE REVIEW

Work-based learning is not exclusive to LJMU and exists in many higher education programmes in the UK (Nixon et al 2006)[1]. What is perhaps innovative, in the case of the LJMU WoW scheme, is that the University supports the idea in the administrative and programme development areas. A Graduate Development Centre (Fallon 2009) [2] has been created, which students can attend for specific graduate work related skills such as interview techniques and CV writing and also Faculty Skills Support Officers have been employed to interact with staff and students to assist with the implementation of the initiative at the programme and student level. One of the end products of the initiative is a "Graduate Skills Certificate" (Larson 2009) [3] that can be used by students to provide prospective employers with an understanding of the transferrable skills held by the student. The technical skills obtained from the specific programme material are covered in the degree transcript.

WBL gained a boost in 1997 by the "Dearing Report" recommendations, which found that institutions should "increase the extent to which programmes help students to become familiar with work" (UEL 2007) [4]. Glasgow Caledonia University has set up a "Scottish Centre for Work Based Learning" and has several courses specifically devoted to "recognising the wealth of untapped knowledge in the workplace" (Gcal 2008) [5]. Thus implementing work based learning into a degree programme structure is seen as important in the UK University sector if not a UK requirement. The types of WBL are many. "Brief Encounter, Short Project and Sandwich Placement" (Brennan and Little 1996 pg 10) [6] plus "Independent Studies and Negotiated Learning" (Boud and Solomon 2001 pg 8) [7] are just a few that can be identified. These examples however do not consider the use of WBL in the context of shipping business or maritime and logistics in general and thus this is the subject of this paper.

Seagoing has always used WBL as a crucial part of the learning process towards the attainment of a Certificate of Competency. The title Nautical Science (NS) is the UKs name for diplomas and degrees directed towards seagoing deck officer qualifications. At degree level these courses are offered at BSc (Hons) and (Foundation Degree) FD levels (Bonsall et al 2006) [8] and by virtue of the professional competence required, students must have 12 months seatime before obtaining their OOW Certificate of Competency and a further 18 months in order to achieve Chief Mates. It is the first 12 month period that is counted as the "Work-Based Learning" by the FD NS and BSc (Hons) NS programmes. This period has to be assessed and therefore time is available in the college sessions for discussion on the nature of and activities undertaken during the WBL. Owing to the assessment requirements of the Nautical Science routes only service on certain ships is applicable and must be approved by the Maritime & Coastguard Agency (MCA). This means that students not gaining service on UK ships will not be able to satisfy the WBL element of the NS programmes and thus the courses are not open to non-EU students. Some EU students, particularly Polish students have gained experience on UK ships in which case they have been able to take advantage of the programme.

Maritime Business students need time to develop their experience in shipping offices and this is often difficult to obtain (Wilkes 2005) [9], (O'Hare 2007) [10]. Sandwich placements of up to a year are common within the UK University sector and when obtained for LJMU students satisfy the WoW requirement. Unfortunately not all students seek a year out and not all would be able to achieve this even if the demand existed. Thus the maritime business programme team have a dual approach to WoW with all students being involved in a level-2 group project as well as taking part in a level 3 visiting lecturer module which acts as an Autumn lecture series. This generates several assignments and has been particularly successful, with both students and speakers being upbeat about the experience. The speakers talk for 45 mins to 1 hour once per fortnight during semester 1 and students have to produce 5×200 word reports, as part of a group lead a debate and subsequently the groups make and present a poster on the topic of the debate.

3. GRADUATE SKILLS INITIATIVE

In 2007 LJMU centrally started an initiative called JMU Plus. This was an attempt to implant in all courses of 4 semesters or more a set of workplace skills identified by employers as being important key skills for all graduates. JMU Plus or WoW as it has now been termed, also included work related or work based learning to at least 12 credits which is 10 % of one level's work. Tables 1 & 2 show the graduate skills sectors as well as the individual academic skills within those sectors.

In all there are 41 graduate skills and each can be taught, practised and assessed. Programme teams are only charged with assessing skills and not teaching or practising, although in order to assess a skill it is necessary to practise and often, but not always, to teach it. Skills such as spelling and punctuation are not taught within the curriculum, although help classes are available for those who feel weak in this area. However, they are assessed and thus will be practised. Clearly this is done in all written work and now some of that work will have feedback on this aspect.

The requirement is for all skills to be available for completion during the period of any qualifying student at the university. Programme teams must, in their student programme handbooks, show how these skills are can be achieved by mapping the skills to the modules. The practice is for core modules to be used so that all students are known to have the opportunity to achieve all skills even though they may not take up those opportunities. Thus the workload for these skills assessments tends to fall on a few modules.

The initiative has run for 2 full academic years now and only students joining at level 1 of a 2 or 3 year (level) programme were included, thus no student has yet completed and obtained a certificate. During the year 2007–8, the first year of the initiative, most students were only vaguely aware of the scheme's existence. In September 2008, the start of the second year, every student on a 4 semester or more programme was given a memory pen containing the details of the WoW initiative. This was part of the University's programme of raising the awareness of the graduate skills initiative. Thus, through the 2008–9 academic year more and more students have been asking for their graduate skills assessment.

Table 1

LJMU Graduate Skills A – D

Skill	Skill Sector	Individual Skill	
A	Analysing and Solving Problems	1	Identifies potential problems, issues and risks, identifying courses of action and recommends solutions
		2	Seeks out and uses all relevant available information and identifies strengths and weaknesses in arguments/ situations
		3	Breaks down complex information and identifies the key information using logical arguments/ reasoning
		4	Relates and compares information from several sources, reviewing evidence before coming to a conclusion
		5	Distinguishes between facts and assumptions, drawing clear conclusions from complex information
B	Team working and interpersonal skills	1	Involves self and others in tasks and acknowledges other people and contributions and perspectives
		2	Shares information and gains commitment by putting forward arguments that are supported by facts
		3	Asks questions to clarify understanding and notes key facts
		4	Makes well-organised contributions, summarising and testing group understanding
		5	Uses different approaches and contributions, summarising and testing group understanding
		6	Has regard to the impact on other people of his/ her actions and decisions
C	Verbal Communication	1	Communicates clearly in one=to-one conversations, listening and responding appropriately
		2	Makes useful contributions to group discussions, listening and responding appropriately
		3	Presents information to a group, demonstrating understanding of the subject material, explaining terminology in language appropriate to the audience, and listening and interacting appropriately to maximise audience understanding
		4	Presents and argument or opinion in a structures way, using evidence to make the case
D	Written Communication	1	Conveys complex concepts in words, diagrams or other media
		2	Structures information appropriately with clear introduction and conclusion
		3	Content of a range of document types/ media items is easily understood and fit for purpose
		4	Spelling, punctuation, grammar and presentation are of the appropriate standard
		5	Demonstrates a variety of vocabulary, style and tone according to the recipient/ audience

Source (JMU PLUS 2008)[11]

The assessment process is proving controversial in some areas. Many skills are easy for staff to assess, others not so. Those concerning group skills can be difficult as within any group it may be impossible to distinguish who has completed what work. A group report cannot generate individually assessed skills as it is not known which member of a group completed which section of the report.

Table 2

Graduate Skills E – H

Skill	Skill Sector	Individual Skill	
E	Personal Planning and Organisation	1	Sets targets and priorities to take account of short and long-term needs
		2	Establishes a course of action for self and/ or others to accomplish a specific goal
		3	Regularly reviews objectives, improvement plans and career development plans
		4	Actively seeks feedback on performance and identifies further learning opportunities
		5	Ensures that opportunities are found to reinforce new and developing skills, and keeps up to date
F	Initiative	1	Able to act on own initiative when appropriate to the situation
		2	Recognises and develops "innovative" solutions to work and/or study, looking for new or better ways of doing things
		3	Demonstrates initiative by taking on problems/ task outside his/ her normal role without being asked
		4	Makes decisions in appropriate situations and seeks to learn from the outcomes
G	Numerical Reasoning	1	Utilises numbers to communicate ideas
		2	Handles numbers accurately, efficiently and can apply skills in context
		3	Interprets data in charts, tables and graphs and appreciates their importance in displaying data
		4	Analyses and interprets the different relationships between sets of numbers
		5	Recognises patterns and underlying trends in data and can use them to generalise and interpolate
H	Information Literacy and ICT	1	Recognises an information need and is able to construct an appropriate strategy to meet that need
		2	Locates and accesses information, with an understanding of provenance and relevance
		3	Demonstrates a good understanding of databases being able to set up simple databases and being able to use complex databases set up by others
		4	Sets up and uses a spreadsheet to solve a problem
		5	Uses a presentation tool appropriately
		6	Uses other general-purpose software effectively
		7	Utilises ICT safely, securely and legally

Source (JMU PLUS 2008)[11]

4. DATA COLLECTION

The data for this paper has been collected over the last six years of delivering the project module "Project Preparation and Commercial Project". This module fits well with the WoW initiative, however preceding it by several years. This is not unique within the University with many schools and programmes having work-based elements to their curriculum. Indeed the BSc (Hons) Management, Transport and Logistics course has had a 12 credit WBL module at level 3 for the 14 years of the programme.

Feedback forms from both students and managers involved in the Maritime Business level 2 WBL module have been collected after each series of projects and these results can be reported here. In the last two academic years the new autumn lecture series has brought in several outside speakers and has seen the idea of debate introduced to the undergraduate programmes. This initiative has been successful with students and speakers being pleased to be part of the events. Feedback and experience from this programme is also contained in this paper.

Tables 1 & 2 show all the graduate skills with their generic areas. It can be seen from these tables that some skills are readily obtained whilst others may be difficult to provide in a programme. The University has provided some on-line maths tutorials for use by students on non mathematical programmes in order that they can obtain the numerical skills sector skill. Skill H5 "Uses a presentation tool appropriately" is perhaps easy to provide and assess; Skill I3 "Demonstrates a good understanding of databases being able to set up simple databases and being able to use complex databases set up by others" is not so easy to provide if databases are not part of the syllabus of any programme module. The method of feeding back to students takes a variety of forms: from a straight statement that a skill has been passed to verbal statements that a student is working toward a skill but not there yet through to a numbering system of 1 outright fail to 5 clear pass. The Skill Support Officers have started to develop databases of student skills in order to monitor the development of students through the skills profile.

5. MARITIME & LOGISTICS MODULES

The Maritime Business and Logistics programmes have both had work-based opportunities in them prior to the WoW initiative. Both were in the form of projects, however the logistics projects were offered at level 3 the final level whilst the maritime projects are offered at level 2 at the end of the project preparation module. The maritime programmes have to cater for more students (circa 30) whilst the logistics programme generally has less than 10 students. The logistics module runs over the whole of the final year, whilst the maritime project is just in the last 4 weeks of level 2. One of the main problems for both sets of programmes is finding projects. The logistics programme has used the University as a business having logistics problems and thus student groups have been able to work on these. The maritime business programmes must use firms in the Liverpool area close to the centre, although the Port of Liverpool was used this year which is a 30 minute bus ride outside the centre. Over the six years of the maritime projects it has always been possible, be not necessarily easy, to find firms willing to engage in these projects. In general firms are happy to help if possible.

5.1. The Maritime Business Module

The Maritime Business WBL module is at level 2 and called "Project Preparation and Commercial Project". The WBL section is the commercial project part with the project preparation part providing an introduction to students to the work they will have to do during the level 3 dissertation. Putting the commercial project into the project preparation module provides the students with the opportunity to go out into the workplace and meet with industry managers and perhaps forge links for data collection in their level 3 project. It may also open up career possibilities on graduation.

The commercial project is 40 % of the total assessment for the module and thus does not equate to the 12 credits required by the WoW initiative. It does however work towards this requirement and with the level 3 visiting lecturer module has satisfied this need for validation purposes. The nature of the commercial project is that all level 2 maritime business and maritime studies students will have to opportunity to be involved. Occasionally a student decides not to be involved and thus loses the marks but can still pass the module on the remaining 60 % of the assessment. Students are put into groups of 3 to 5 members, often those with the same interests. Thus students who have shown a desire for navigation will be in the same group/s and given a project in or close to that area. The students must work for a nominal 20 hours each on the project and produce a 10 minute presentation with 5 minutes of questions plus a 1000 word group report which can be given to the firm to close the feedback circle with them. Table 3 gives the titles of projects attempted over the years.

Table 3

Maritime Business Projects

Project Title	Company	Year	Project Title	Company	Year
Heavy Lift Movement	Warrant Distribution	2003,4,5,7&8	Museum Displays	Mersey Maritime Museum	2006&8
Company Induction Process	ACL	2003,4,5,6,,7&8	Ferry Opportunities	Mersey Ferries	2005
Database Analysis	Mersey Maritime	2003	Ship Management	Meridian	2007
Customer Analysis	Hapag Lloyd	2005	Ship Management	Bibby Ship Management	2008
Database Design	Bibby Line	2005	ISM Code	Meridian	2008
Port State Control	Marine & Coastguard Agency	2006 &7	Customer Complaints	Meridian	2008

Table 4

Examples of Transport Projects (Roberts 2009)[12]

Project 1 (Movement of People)	Project 2 (Movement of Goods)
University Analysing problems of students needing to access an out-of-town site away from main teaching and learning resource facilities	*Consultancy/Home delivery business* Assisting a consultant producing a report into efficiency improvements in home deliveries
University Reviewing the implementation of a workplace travel plan	*Logistics company* Looking at the employment market and advising the company on whether its terms and conditions for managers were appropriate for the market
Passenger Transport Executive Analysing passenger flows on a selected railway route into a city centre and suggesting service enhancements	*Transport authority* Advising the authority on issues relating to the introduction of controls on road freight transport operations in a major city
Passenger transport group Producing a methodology for analysing the market with an anticipated reregulation of local bus services	*Consultancy* Assisting the consultants with work they were carrying out for the Department of Transport on Freight Best Practice
Local authority Advising the authority whether a commercially viable heritage tourist bus service could be introduced	*University* Analysing the market for Masters level courses in logistics and international trade
Passenger Transport Executive Examining options for light rail operating replacing conventional trains on a radial route into a city centre	*Coal producer* Advising the owner of a number of collieries in the of options for using their sites as logistics centres following the cessation of coal production

The projects are developed in discussion with the firms. There is some reluctance from firms new to the initiative and some firms prefer not to continue in future years for a variety of reasons. Some, such as "Warrant Distribution" seem more than happy to take part year on year even if only contacted at a moment's notice. Input is needed from the firm, thus for firms new to the projects it is necessary to have preliminary discussions in order that the requirements are understood. The projects developed out of a need for students to be involved in the "real work" process and not to be just spectators as they are in the case of an industrial visit. They are therefore required to become involved and the firm's managers are told that it is for the students to run the project and to report back to them at the end.

The firm's managers then have the opportunity to feedback to the students. After the first round of projects it was decided to appoint each year an academic supervisor for each group. This supervisor is only there to provide advice to students not to be involved in any way with the development of the project. Often the academic supervisor will attend the first meeting with the firm but the managers are told not to discuss the project with this academic but to focus the discussion on the students.

5.2. The Logistics Module

The logistics WBL module has been part of the Transport and Logistics degree since its inception in 1995. It has always been at level 3 as that programme team felt that students below this level would not have sufficient confidence and background to do justice to the projects or the firm offering the projects. These projects differ from the maritime business projects in length, number for each student and student deliverables. Table 4 shows some of the logistics projects studied since 1995. Each student takes part in 2 projects, one in each of the two academic semesters. The semester one project is movement of people and the semester two project is movement of goods. Owing to the small cohort on the logistics degree only one project per semester has been studied with students split into groups with each focusing on a different aspect of the project i.e. one group may take the financial and profit aspects and another may take operational aspects. The programme leader has always taken the lead role in these projects and accompanies the students on visits to the firm.

The student deliverables are a presentation on the firm's premises and a major report at the project end. This report may be several thousand words long and is more comprehensive than the report required for the maritime business project.

5.3. The Maritime Visiting Lecturer Series

Outside speakers are always good for student development and add much to any programme. The Maritime Visiting Lecturer series is conducted under the title of a level 3 module called "Contemporary Issues". The series consists of 5 lectures with each lecture immediately followed by a seminar to include the outside speaker. The week after the visiting lecturer has attended a group of students hosts a debate, the motion of which is derived from, and is drafted at the talk. The student group chosen to lead the debate thus has one week to prepare their side of debate, whether for or against the motion. The week after the debate the next outside speaker presents and the student group leading the previous week's debate presents a poster showing their assessment of the issues covered.

The student deliverables are that each student must submit a 200 word report on each of the visiting lecturer talks, be part of a group leading a debate and presenting a poster. The poster is worth 30 % of the module marks and the debate and reports are each worth 35 % making each report worth 7 % of the module marks. The students have the opportunity to talk with the visiting speaker and can often follow up dissertation issues with those speaking in the same area. Table 5 lists some of the visiting speakers and debate topics.

Table 5

Contemporary Issues Visiting Speaker Topics

Topic	Speaker's Firm	Topic	Speaker's Firm
2007/8		2008/9	
Ultra Large Container Ships	CMA/CGM	Ultra Large Container Ships	CMA/CGM
Loss adjustment	Hogg Lindley	Marine Insurance	Attain Training
Developments at the Port of Liverpool	Engineering Manager PoL	Liverpool Cruise Facility	Liverpool City Council
Port State Control	MCA	Maritime Clusters	Mersey Maritime
CPAT	Mark Rowbotham	The Marine Bill	Hill Dickinson

6. FEEDBACK

The general feedback overall is very positive from all parties about these modules and the potential benefits to students. Benefits to firms are less obvious and some employers feel that there are no immediate benefits. Clearly in the long run the experience gained by students will enhance their employability and it also acts as a form of advertisement of the firm and its place in the market. Specifically with the maritime business level 2 project some firms are unwilling to take part a second time. There is a time commitment from the firm's managers and the return on this commitment is intangible. The need for the firm to be part of the educational process is a bridge too far for a small firm or those with limited managerial time. Employers usually find that students don't ask enough questions and take the most advantage of the expertise of managers. Recently a student group complained that they hadn't had support from the firm with the firm replying that they hadn't asked for support and complained that the deliverables from the students were the poorer for lack of this input.

Maritime student feedback is usually very good although students do like to do projects linked with their own career goals or in their academic area. Maritime students faced with the development of websites, even if the project is only to provide the material for a website, see this as outside their academic area and even when told they may have to do this when they first start work, they feel somewhat cheated if the project isn't changed. Similarly in 2007 a maritime business group was given a project to look at the transport plan for Liverpool but felt that this was not maritime business and thus not their area. The students also feel that the project comes at the wrong time, being in the last 4 weeks of semester 2 and thus just before the examinations. The programme team, whilst hearing the complaint, feel that the timing is right as the students are well through level 2, have lots of coursework behind them and in the six years of the projects no group has failed to present reasonably successfully except for the time the students refused to take part on content grounds.

Feedback on the logistics projects is always very good. Students find them challenging and firms are pleased with the deliverable. Through the years the logistics programme external examiners have always been very complimentary about these projects. Students do feel that where they have to work within LJMU then the project is less real but even then they can see the advantages.

Feedback on the visiting lecturer series and the deliverables from the students is that they enjoy the talks and find the debates and posters stimulating and beneficial. The 200 word reports are disliked initially because students have problems reducing their word count to 200. Visiting lecturers and firms involved in the series find the report size very good as in the workplace there is a need for short concise reports on events including talks and conferences attended by employees and these short reports are good practice. The more reports submitted by the students the better they become and the more adept the students become at reducing the word count. Thus the programme team feel that this assessment is particularly relevant.

7. DEVELOPMENTS

All three modules have run several times and thus there is experience of each to use for any developments. Also the modules have been integrated into the LJMU Graduate Skills and WoW initiative. This aspect means that there is less opportunity for development than before WoW as the integration means that changes must be considered in line with any impact for the programmes on their WoW status. This said at all times all modules are considered for development to a greater or lesser degree.

The level 2 commercial project suffers from the poor student/ firm feedback at the project end. The culmination of the module is a seminar held outside the University campus in an industrial setting. For 4 years this was in the Mersey Maritime board room and for the last 2 years it has been the Liverpool Chamber of Commerce council chamber. The setting and event aspect of the seminar has been excellent with students rising to the occasion and the ability to get five or six employers in one place listening to student presentations being well received. The fact that all employers have not attended is a problem because one or two groups have not presented to their firm thus the feedback loop is not closed and students feel let down. A possible development is for the students to present in the firm at a time convenient to both parties. Difficulties here are standardisation of marking and difficulty of providing academic staff members to do this.

The level 3 logistics project has run in its present form for the life of the module and there doesn't seem a need to update this. Difficulties arise in finding suitable projects and fitting projects to group size. This has been achieved in the past thus immediate developments are not planned.

The visiting lecturer series has run well for 2 years and the assessments have proved useful. There is a standardising problem if the same assessors don't assess all projects. Students have shown disquiet with some marks owing to this aspect. The increase in discussion areas through a more diverse range of speakers is one development, however this will be done on a talk by talk basis when speakers become available.

The integration with the graduate skills initiative has gone well with University skills assistants providing positive feedback about all 3 modules. Some graduate skills are difficult to assess, however these modules provide a flexible way of achieving that assessment.

8. CONCLUSIONS

Work based learning is now an integral part of the undergraduate programmes offered at LJMU and this development has enhanced and improved the provision for students. The graduate skills initiative has assisted in defining, for the programmes, the amount and type of WBL to be provided and has provided a focus to key-skills' modules learning outcomes. The programmes are better for inclusion of these graduate skills as they can provide a catalyst for the topics of assignment work. Feedback from companies is that the industry projects and visiting lecturer contact with the programme and maritime section are welcomed and from the students that they value the experience.

References

[1] Nixon I, Smith K, Stafford R and Camm S (2006) Work-based learning. Illuminating the higher education landscape. Final Report. The Higher Education Academy. July, p. 3.

[2] Fallon H (2009) Graduate Development Centre LJMU. Found at http://www.ljmu.ac.uk/gdc/ Accessed on 7th May. Site updated on 24th April.

[3] Larson R (2009) My Skills. Found at http://www.ljmu.ac.uk/WoW/students/96212.htm. Accessed on 7th May. Site updated on 29th April.

[4] UEL(2007) University of East London Work Based Learning. Found at http://www.uel.ac.uk/wbl/index.htm Accessed on 7th May 2009.

[5] Gcal (2008) Scottish Centre for Work Based Learning. Found at http://gcal.ac.uk/scwbl/index.html Accessed on 7th May 2009. Site updated on 8th September.

[6] Brennan J and Little B (1996) Table 1 Spectrum of experience-led work based learning (WBL) in A Review of Work Based Learning in Higher Education. DfEE Quality Support Centre. The Open University.

[7] Boud D and Solomon N 2001 Work Based Learning A New Higher Education. Open University Press.

[8] Bonsall S, Wall A & Wang J. (2006) The Changing Business Activity of UK Maritime Institutions. IAMU AGA 7. Dalian Sept.

[9] Wilks J (2005) Interview with Author. Past LJMU Maritime Studies student (1991 – 1995) who undertook a sandwich placement. June.

[10] O'Hare J (2007) Interview with Author. Past LJMU Maritime Business student (2004 – 2009) who undertook a sandwich placement. March.

[11] JMU PLUS (2008) WoW (LJMU Plus): Strategy for Confirmation of Graduate Skills (GS) and Recording of Work-Related Learning (WRL) 2008 – 2011. Faculty of Science, p. 29.

[12] Roberts C.C (2009) e-mail to Author. April.

MET AND INDUSTRY – GAPS TO BE BRIDGED

Quentin N Cox,
MA, Captain, Senior Lecturer,
School of Management and Post Graduate Studies
Warsash Maritime Academy
Southampton Solent University
E-mail: Quentin.Cox@solent.ac.uk

Abstract. It is not a new contention that too many 'products' of MET globally, do not appear to posses an holistic portfolio of skills and attributes. The demands placed upon a modern professional maritime practitioner are not being met by what is being produced by the maritime educational and training establishments. The various stakeholders within the industry are often quick to point the finger of accusation. Employers claim the 'product' of training is not adequate for the work and will imply the colleges and academies are not fulfilling their part of the bargain.

Regulators, such as Port State inspectors, may feel the same and feel no reluctance to voice their concerns. Commercial ships inspectors, who claim to be attempting to raise the standards of commercial practitioners, appear to place unrealistic demands upon the practical abilities of ships' staff. MET institutions may share this view and they, in turn, claim the 'raw material' they are obliged to mould into a competent seafarer is deficient in the basic skills of mathematics, physics and linguistic articulation. This paper attempts to analyse the holistic nature of an adequate product of MET, identify these abstract qualities and suggest methods of contributing them to the MET process.

1. INTRODUCTION. WHAT CONTRIBUTES TO THE HOLISTIC SEAFARER PRODUCT? WHAT IS THE EMPLOYER AFTER?

The employer, the shipping company, requires holistically developed individuals who retain social skills. They are looking for individuals who will know their limits and when to ask for assistance. They want individuals to take on the responsibility of making decisions and living with the consequences of those decisions.

Numerous recruitment sources, such as the Courses and Careers for UK School Leavers, cite examples of the required personal qualities as being "prepared to accept responsibility not only for making important decisions yourself but also for inspiring confidence in the crew" [1]. They go on to list additional qualities such as knowledge, leadership, communication and team-working skills in order to "keep complex systems running in extremes".

Employers require their staff to be able to synthesise the mutual objectives of safety and commercial success and how, most expediently, to achieve both. They will need to become familiar with and implement Quality Management and Safety Management Systems and to be conscious of corporate image and how easily it can be damaged.

They will need to understand the consequences of ill-prepared approaches to work and to be observant, to record and note operations in the correct detail. They will need to understand the continuous nature of the work and the importance of maintaining the operation.

Staff have to understand the significance of safety and protection of life at sea, on board, of their fellow crew, of the cargo and of the environment. They will have to protect the cargo, maintain it in an acceptable condition and to carry out tasks, as well as safely, economically and efficiently.

Employers will want their recruits to develop skills not practiced elsewhere and to supplement skills that were. This could be with both electro-technical equipment and more traditional manual type of equipment.

They will want these staff to be capable of Independent thinking, to utilise analytical skills and be able to apply skills and knowledge learned elsewhere. They will need to synthesize skills and knowledge learned elsewhere by way of a constructivist approach to this gained knowledge. They will have to analyse problems, engage in troubleshooting and to investigate causes and apply solutions and to communicate these with necessary staff.

They will have to exercise self discipline, rest, personal hygiene, drink, if there is any and to learn to learn, to study and to take the responsibility of finding information, rather than to be spoon fed. They will need to take the opportunity to practice, e.g., use of the sextant, compass errors, passage planning, other ships' equipment.

Employers will want their trainees to develop (construct) an understanding of the ship's operation and their part in it.

They will need to develop (construct) an understanding of their part of a departmental team and on a larger scale, a shipboard team and to understand their responsibilities in both technical and non-technical arenas. They will evolve to understand their own role and participation in the shipboard team and the management of the ship. In the same light they will also need to nurture the relationship with shore side management.

They will have to integrate into the working of the ship's operations in terms of both technical accomplishment, working equipment and non-technical skills, teamwork and to develop cultural understanding, both on-board and ashore and to develop tolerance.

They will be required to develop managerial skills, of people resources and equipment and to develop leadership skills, fairly early on.

They will have to accept and delegate operational instructions as appropriate. It is no co-incidence that human factors have taken so long to appear in the curricula of maritime training. Intertanko's Tanker Officer Training Standard (TOTS) includes a human factors section early in the proposed programme and there is good reason for this. There has been very little of this incorporated into college / academy work. Only now are non-technical topics starting to appear in training schedules and the human factors in TOTS, which will, to some extent, be incorporated into STCW in due course. The American Bureau of Shipping (ABS) Classification Society Crew Resource Management (TOTS) [2] Course identifies such significant factors.

2. WHAT IS FAILING NOW THAT DIDN'T FAIL IN THE PAST?

"As everyone in shipping is aware, the global shortage of seafarers, especially officers, has already reached significant proportions and is now a source of genuine concern to all involved in the industry".

IMO Secretary-General Efthimios E. Mitropoulos (IMO, 2008) [3].

Most of my MET colleagues and I, when considering our own apprenticeships, recall an environment which was conducive to training. The companies were used to cadets on board their ships. By the "companies", I mean the office administrators as well as the ships' staff. This does not always seem to be the case these days.

In some instances, there appears to be no structured apprenticeship at all. My own experience as an apprentice with an 'oil major' was a relatively positive one, certainly in terms of preparation for a job as an officer. Recent research suggests similar experiences still exist but on an arguably smaller scale. Just about every ship in the fleet was used to cadets not just in terms of berths / cabins but the other staff on board. Outside of working periods, where certificated staff were familiar with the task of training and teaching the job, cadets had study periods, working on correspondence courses prepared by the maritime colleges. During quiet periods on bridge watches, traffic or buoyage situations were presented (with teaching aids provided by the company) e.g., magnetic 'smartie' boards, depicting vessels' lights.

The culture and social environment in which a cadet lived and worked on board a company ship, was directed toward their learning and development. It was an archetypal example of 'Activity Theory'."that human mind comes to exist, develops, and can only be understood within the context of meaningful, goal-oriented, and socially determined interaction between human beings and their material environment". (Ryder, 2008) [4].

The lack of value placed upon an apprentice by the employer seems to be a frequent complaint now. Many a case of anecdotal evidence come from my university colleagues whom tutor maritime apprentices, between spells away on ships. Other ship staff appear entirely disinterested in their development as potential officers and they are left to shadow a crew member who may not even speak the same language.

It was a common, though not always well founded, observation that cadets' labour was abused – an imbalance of chipping and painting instead of picking up technical skills. Though basic skills should be experienced, so they will never make a request for job they haven't done themselves a healthy balance of practical maintenance work and technical operation should be the basis of a cadet's day to day employment.

The apparently simple task of having an agent meeting them at an airport and co-ordinating the joining of a ship appears to be beyond the capability of some employers. No wonder apprentices become disillusioned, when treated in this manner early in their sea-going careers. It's easy to criticise what looks to be a lack of backbone and adventure but the more thrifty employers, reportedly, often over look such considerations.

The alarming rate of attrition of 15 % (Smith, 2009) [5] is reportedly due to poor working and living conditions on board and a lack of value placed upon apprentices by their employers. The experience of these cadets on board is not good, compared to one working for a more major employer.

The monthly trade journal Maritime Executive Magazine (2009) [6] reports on a three day workshop organised by Intertanko and the ITF for young seafarers. Their conclusions indicated concerns of the following issues:

- Attracting people to go to sea;
- The criminalisation of seafarers;
- Piracy;
- The importance of shore leave access;
- On board training;
- Safety and security on board;
- Job security and employment related issues;
- Accommodation standards;
- On board living conditions.

Does the experience of apprentices vary between cadetships offered by Ship Owners and those by Management Companies? (Smith, 2009) [7]. Empirical evidence suggests there is a difference, with the latter offering a less comprehensive apprenticeship.

Before we fall into the trap of stereotyping the employers in this way, we might also seek to understand the pressures imposed upon them by market conditions. The difficulties and concerns expressed by the trainees, above, are not exclusive to the young seafarer. Some of these factors affect the employer at large.

This is certainly so in terms of trying to attract persons of appropriate age and education into the industry. The result of this obstacle is that the bar is lowered. Since so many berths have to be filled, the less capable candidates are taken on. The problems encountered by the employers are not exclusively with apprentice numbers but certified officer numbers.

With the dearth of certified officers having become a significant problem, more flexible training programmes have been established of a shorter duration than in the past. Therefore, the problems articulated above are being addressed with some degree of success yet this approach has brought in more problems. It's almost like a risk reduction measure, where one might ask, "Have further risks been introduced?" In this case, one might conclude, quite possibly.

This is perhaps where the complaints of the MET establishments come in regarding the quality of the 'raw material', a point which is addressed in section five of this paper.

A view of some observers, commonly MET establishment tutors, is that there is too much fast-tracking through an apprenticeship. Whilst individuals may end up with a pile of certificates and qualifications, they have very little experience. Being promoted way too early (I only spent two trips as second mate myself) is largely due to lack of qualified staff within the employers workforce. So the net experience possessed by the qualified work force plummets.

Qualifications are no substitute for experience.

The lack of seafarers globally and especially qualified officers has been a continuing theme in the industry for a long while. This creates a dilemma, in that the industry has to appear to be attractive to school leavers (to comparable careers) at the same time as being safe and cost-efficient.

The allure of post-sea qualifications, as espoused by the Nautilus Telegraph (2009) [8], gives the potential recruit the choice of pursuing shore-based careers beyond sea-going careers. Though it may be argued this move may be counter-productive it would achieve the objective of bringing much needed staff into the industry. This possible counter product may not materialise, as evidenced by Phil Smith's study (2009) [9] since many newly qualified seafarers expect to leave the sea in the short to medium term for a variety of different reasons.

The lack of recruitment into the shipping industry has long meant a knock-on effect for peripheral interests.

"After successfully lobbying, the Chamber of Shipping is pleased to see that the Migration Advisory Committee has recognised that ship and hovercraft officers are a shortage occupation in the UK in its report – Skilled, Shortage, Sensible: The recommended shortage occupation lists for the UK and Scotland". (Springett, 2008) [10].

So to solve our own dilemma will assist others.

There seems to be a sense that since training became de-regulated, standards have lowered. More training establishments from a more diverse spectrum of cultures and nations have developed. Much training has developed from non-traditional maritime cultures which have been priced to compete with the more traditional ones. The cheaper the training option, often, the lower the quality. The cheaper options tend to concentrate on quantity rather than quality and what is good for mass production standards is clearly not good for today's maritime employer. It is the non-technical skills which tend to be forgotten. Behaviourist, surface learning-by-numbers training tends to prevail.

The notion of an officer apprenticeship does not seem to exist anymore, on the same scale as it has in the past. There are very few employers asking that apprenticeships become extended in duration. They want their cadets trained quickly and cheaply, the quicker and cheaper the better. In the past, shipping companies were like big families in which staff would remain all their working lives. Indeed, many large shipping companies were family concerns. Promotion was slow but by the time it was achieved, the individuals knew their job well.

Now training seems to be completed as quickly as possible. Whomever offers a training programme, someone else will offer it cheaper, even if it means going to a distant location. I witnessed the change of ratings from European, to Filipino to West African. Now even Filipino ratings are considered too expensive by many so Vietnamese are being lined up to take their places.

"Vietnamese seafarers have earned a reputation as industrious, highly educated workers and can serve aboard international merchant vessels" (MOL, 2006) [11].

They're also cheaper than many.

NYK currently employs about 180 Vietnamese seamen and plans to substantially increase the number of Vietnamese seafarers in its ranks (NYK, 2006) [12].

Vietnam, a nation currently developing fast in the maritime arena, is not considered to be a traditional maritime nation. These are indications of some of the obstacles over which the nation had to climb. Partly as a result of this a 1999 report on MET in Vietnam included the following observations related to "poor and obsolete training programmes and syllabus" and "with outdated theories". Though the graduates from these MET institutions may be well qualified, they "lack hands on experience" and "are completely unexposed to actual working environments". They are "handicapped in passive working attitude" and "a poor sense of responsibility". The Merchant fleet of the country was reported to be "tiny and obsolete". (United Nations Economic and Social Commission for Asia and the Pacific, 2000) [13].

So what improvements were suggested? They included improvement in "teaching methodologies" and the aim to have teaching staff attain higher academic qualifications.

Programmes were established to encourage teacher exchange with Australia, the US and UK. It's no co-incidence that these are nations with a more traditional seafaring heritage. Individual Vietnamese ship owners have also been encouraged to develop in-house training programmes. So this is how they are approaching their perceived short-comings. We must resolve to make good our own short-comings.

It is estimated that about a third of the seafarers currently manning ships around the world are Filipinos.

But this dominance is continuously being challenged by other nations like China and Vietnam who can settle for lower pay and poor working conditions". (United Filipino Seafarer's Union, 2004) [14].

It is not only the rise of Vietnam in terms of the provision of seafarers that is noteworthy. They harbour aspirations of competing with Hong Kong and Singapore on the provision of transhipment facilities. (John, 2009) [15].

The relevance to this article is that as far eastern countries gain in confidence, they will compete with the more traditional sectors of the world in maritime business. The concern is, will they be accompanied by the traditional maritime values?

3. HOW CAN THE MET PROCESS IDENTIFY THE NON-TECHNICAL QUALITIES REQUIRED?

As alluded to earlier in this paper, when I think back to my own apprenticeship, most non-technical skills were acquired at sea. By any comparison, sea staff including trainees, re given more responsibility earlier in their careers than most of their counterparts in other industries. The professional activity of their ship mates lends itself to this objective, which becomes mutually beneficial. A facsimile of this is very difficult to achieve during the periods at the MET institutions where are manifestly not so suitable for the objective. Acting as 'Leading Cadet' for an accommodation block hardly matches the type of responsibility for monitoring cargo or navigation operations. Ultimate responsibility for decisions may not rest on the shoulders of the trainees but the sense of importance of the operations will be clear. These factors will be much more challenging to reproduce at a college or university.

So what can be done at MET establishments? It is a common observation that highly sophisticated simulators may be provided but the value of their use does not correspond with their sophistication. For example, the realism that may be simulated is of little value unless the student actually learns from its use. The de-briefing session following an exercise is arguably the most significant part of the programme. If that part is not conducted purposefully, then the investment in realism is wasted. There is nothing modern about this view. The 1997 NI publication MET A Practical Guide (The use of simulators as tools for training and examining seafarers) [16] declares that the effectiveness of the training depends more on the instructor than the simulating hardware.

It's really up to the employers to supplement the technical education with experiential learning and nurturing.

The social and responsibility skills are more suited to on-board training, where the 'Activity Theory' will be more likely practiced. In terms of academic application and development it may apply whilst studying but within a more technical arena it will apply 'on-the-job'.

As mentioned earlier, the inclusion of more non-technical studies in the shore-based segment of the training, such as human factors, leadership, resource management. It would be appropriate for these areas to be covered at an operational level, not exclusively at managerial level. Problem-based learning, where analytical and critical reflection attributes are developed may provide the nurturing of desirable skills.

As explained elsewhere, the current situation in MET establishments seems to be driven by the employers demanding faster and cheaper training for their staff, rather then the academic pursuit of the establishments themselves.

As an alternative, another initiative is being taken; to try and change the culture of the industry from within. As an extension of this 'career path' post graduate degrees in ship management are starting to appear. In fact, there is nothing new about these type of post-graduate programmes but the way in which they fit into a career path may be new.

The very individuals whom have graduated from modern apprenticeships, may wish to progress along the academic path, for the mutual benefit of themselves and their employers. Then they will see the value of adequate and timely education and training and perhaps communicate these ideas to those above them, within a company hierarchy.

4. WHAT QUALITIES ARE SOUGHT BY EMPLOYERS BEYOND THE 'COMPETENCIES' REQUIRED BY STCW?

With logical reasoning, the STCW convention refers to 'competencies' rather than 'learning outcomes' as a more academic approach might. This seems reasonable, since the Organisation does not see itself as an academic dictator. However, employers may not regard 'competencies' as being enough. Whilst individual competencies may be verified, the employer is looking for trained apprentices with the ability to synthesise, analyse and apply themselves in different ways to different circumstances. Perhaps it is unfair to expect STCW to cover that area of development. Does the IMO accept that the industry at large (incorporating the employers, the commercial demands and the regulatory authorities) collectively require more than just 'competencies' being met? Is it not fair to say that in the past, ship-based sections of the apprenticeship dealt with these aspects?

Reviews of the STCW legislation are on-going, as is likely to be the case with the evolution of any meaningful legislation. Significant changes are planned to enter into force in 2010 but the monitoring of the effectiveness of the convention will not stop. Peter Brady, chairman of the IMO STCW sub-committee recently observed that any further proposed changes should specifically "address requirements for effective communication". (Brady, 2008) [17].

This is another example of non-technical skills (communication) being cited as an area in which to improve, interpreting the point as relating to communication between people, rather than by means of radio waves.

As is often the case, policy or even legislation changes, are dictated by tragedy. In the aftermath of the 2004 Bow Mariner incident, the owners Odfjell, "took the decision to manage its own ships, using an in-house team" (Storeng, 2009) [18]. It's CEO Terje Storeng declared later, "you need skilled personnel. It's about training, training, training. We're on the right track in educating seafarers". "Ships are complex, needing skilled officers and crew".

So does that mean Mr Storeng is distinguishing between training, education and skills? Perhaps, if that were so, the provisions of the existing STCW competencies would have prevented this tragedy. The fact that it didn't results in this CEO reflecting on the provisions of training, education and skills for the seafarers on his ships.

It is not an easy task to attempt to answer these questions but if we might refer back to the first reference in this paper, taken from Courses and Careers for UK School Leavers, then the personal qualities mentioned (leadership, communication and team-working skills) are examples of precisely what is not covered by the STCW 'competencies'. As argued at the beginning of this section, the convention does not purport to do so and it is inappropriate for us expect it to in its present form. That is why there are more examples, again as quoted elsewhere in this paper, of such qualities being enhanced by non-technical training, such as specific crew resource and leadership training. It is widely mooted that precisely this type of training will be incorporated into the STCW convention in the future. That should re-assure the likes of Mr Storeng and his counterparts in other employers' organisations.

In the meantime the gaps between what is produced by MET establishments and what is required by industry have to bridged by other means.

5. WHO ARE THE STAKEHOLDERS WHAT, IN EACH CASE, IS THERE STANCE?

Charterers, who via ship inspection procedures, claim much the same, in that they often feel ships staff are not able to cope with the totality of demands.

Colleges and academies, who claim that the raw material they're given to work with, is flawed. Their basic mathematical and communicative skills are inadequate when the leave school and start training.

The educational practitioners may complain at the poor quality of the 'raw material' but they have a commitment to be up to date with their material and to engage their students in the most effective way. Again, this relates to a completely different debate, beyond the remit of this paper. Nonetheless, that commitment should not be forgotten by the practitioners.

The academic and training (MET) institutions have a requirement to be able to deliver a quality product and quality experience to the students. If they don't, students won't attend, apprenticed company employees will not be sent there and they will fold. Just like shipping companies, MET establishments live on their reputation which can easily be tarnished. Just like shipping companies and traders, they have commercial interests and competition to consider as well.

Potential trainees who are not attracted to the industry because of its image, eg, pollution, criminalisation, piracy, lack of shore leave and security issues, as listed above.

The reputation of an MET establishment may also have an influence on which are chosen by sponsoring employers. Living conditions of the apprentices will be a major factor but so will available resources of the MET establishments. They often complain that their own resources are too low to offer a better MET programme than they do. However, more resources and newer equipment does not necessarily make for a better MET experience.

There is evidence to suggest that the existing STCW Convention and even more specifically, tanker endorsements, do "not supply the level of comfort required" by the employers, the companies themselves. (Wilkins, 2009) [19].

The P&I Clubs and Liability Insurers have their own perspective on the current state of the industry. "As the liability insurers, we are conscious of the fact that human error plays a very major part in liability claims. With the sort of manning problems that are now being faced, it's only likely to become more of a problem (Bardot, 2007) [20].

In order to attract better quality recruits, employers, through MET institutions, have started to offer degree programmes, to supplement apprenticeships. On one hand, this may not solve the shortage of ships' staff for long, since newly qualified officers may wish to follow their career path ashore. On the other hand, gaps are filled temporarily and employers benefit from these individuals' experience of own company fleets. In addition, recruits of degree programmes may arguably be of a better academic quality. Naturally, this raises the counter-argument that ships' staff don't all need to be thinkers and academics. Ships need their fair share of craftspersons.

The introduction of degree programmes has been due partly as an attempt to raise the status of the cadet. For reasons mentioned elsewhere in this paper, a career at sea may not appear as attractive today as it has in the past, to the school leaver. So it has to 'compensate' by making the proposal more attractive. In other industries, 'compensation' is often made by offering higher salaries but this is not an option in shipping today, where a reduction of costs is more prominent.

So those employers that can afford it, offer a 'career package'.

As specific demands result from the evolution of the shipping industry, knee jerk reactions occur. For example, the emphasis on the supply of LNG tankers and the training of their staff, has taken the industry by storm, not to say some surprise. So how does the industry respond? By building hundreds of new LNG tankers and then, afterwards, pondering on how they should be manned. So the authorities leap into action, setting out LNG training guidelines. Yet, there is actually no set standard. The SIGTTO standards "have been widely adopted but, since they are only providing a suggested syllabus with no standard of delivery or assessment" those standards are bound to vary between MET organisations. (Whitcher, 2008) [21]. MET institutions set what they feel is appropriate, so the standard is bound to vary. If the assessment pass marks were too high, not enough staff would pass and employers would send their staff to be trained and assessed at an institution which did pass them more regularly.

A review of literature centred on liquefied gas tanker training yields most interesting results. One copy of LNG World Shipping Journal (August / September 2008) includes a specific section associated with training. Study these quotations:

"The courses that work most effectively are those which are based on easily digested text;" "high-specification graphics and photographs that can be quickly absorbed" (Dawson, 2008) [22].

So the emphasis here is on *quickly*.

Two significant operators "have recently extended opportunities for [MET establishment] cadets to gain the requisite sea time on board LNG carriers to earn their LG dangerous cargo endorsements" (Urban, 2008) [23].

Dangerous Cargo Endorsements, as incorporated into the aforementioned STCW Convention and now more commonly referred to as 'Tanker Endorsements' were originally conceived for junior staff, with experience, prior to being promoted to a senior position. They were not created for apprentices, with very much less experience.

Describing a simulator based training regime, Soren Einar Veierland of Konsberg, (Veierland, 2008) [24] manufacturer of cargo operation simulator equipment, suggests exercises "can assist the industry in training a considerable number of crew within a fairly short time".

Once again, the impact of speed is inherent within the observation.

Modern apprenticeship programmes are often highly modularised. This means that there is a danger of them developing coping strategies rather than learning strategies. They memorise, sit an assessment then forget, so the material of the next module is unencumbered.

6. HOW DO EXTERNAL STAKEHOLDERS PUT PRESSURE ON THE INDUSTRY? Eg, CHARTERERS' REQUIREMENTS VIA INSPECTIONS

With all the expense of training and crew well being, it is sometimes forgotten that shipping companies are in the business for business purposes.

To that end they will commonly tender for chartering arrangements, which, in the case of cargo ships (tankers especially) involve charterer's inspection. These inspections will commonly incorporate questioning of crew members, which adds more pressure to the crews' on-board experience. Though the subject matters on which the questioning is based are purely technical, the process can be quite intimidating and strong personal qualities are required in order not to be intimidated. Legitimately, vetting inspectors are merely attempting to ascertain the level of confidence with which ships' staff carry out their duties, though the process may appear more of a trauma to the staff involved.

One might reflect again on the reference made to cargo endorsements above and how their issue seems to have become engrained into the very early stages of training. Bearing in mind their original purpose, as depicted by STCW '78, is being distorted, one might suspect the vetting inspector principals to have had some hand in this distortion. After all, it sounds safer to hire a ship all of whose officers and cadets posses a cargo endorsement. Yet the endorsements are only meaningful in a legislative sense to the 'top four'.

On a more parochial front, certifying authorities such as those approving or even conducting examinations have an input. I have been horrified at the prospect of Masters' oral examinations being scrapped (Nautilus Telegraph 2009) [25]. Oral exams incorporate the added component of actually testing an individual's resolve and developing it by experience. The whole ethos of a Mater's oral examination was to put the candidate under pressure. So it would be easy to tell if the candidate performed well under such pressure, since they would surely be subject to just the same when working as a ship Master.

CONCLUSION

Change is necessary but the key stakeholders, one might say the keyholders, have no apparent desire to change at present. Change from within seems to be the only plausible option to us. Employers wish to reduce the cost of filling vacancies. When poaching is not possible, they appear to bring pressure to fast track trainees. Then they complain that their trainees are not adequately developed for the industry. It's a viscous circle.

Yet change may be brought about from within, if shipping company staff can see the difficulties. They are the ones who have the influence to be able to change the culture from within the industry. Educators claim to be able to identify these difficulties but have little opportunity to resolve them, all the time employers put pressure on them to reduce the duration and therefore the cost of training programmes. If company staff, perhaps managers, are exposed to the difficulties from an academic view, then perhaps change from within the industry might be achieved. Appropriate training and education would be delivered over a realistic time scale, giving the apprentices an opportunity to develop the non-technical skills, as well as those competencies deemed appropriate by the STCW regulations and flag state administrations.

References

[1] Courses and Careers for UK School leavers [Online] Available at http: //www.ca.courses-careers.com/articles/merchantnavy_officer.htm [Accessed 18th May 2009].

[2] Crew Resource Management as taken on by ABS, based on TOTS. [Online] Available at http: //www.absacademy.org/files%5CfCrewResourceManagement-TankerOfficerTrainingStand109.pdf/ [Accessed 18th May 2009]/

[3] Mitropoulos, E. E.,2008. IMO Secretary-General. Go to Sea!, p. 4 [Online] Available at http: //www.imo.org/includes/blastDataOnly.asp/data_id%3D23804/Gotosea!campaigndocument.pdf/ [Accessed 18th May 2009].

[4] Ryder, M., 2008. What is Activity Theory? Martin Ryder May 22nd 2008. [Online] Available at http: //carbon.cudenver.edu/~mryder/itc_data/act_dff.html. [Accessed 18th May 2009].

[5] Smith, P., 2009. The Cadet Experience. MSc Dissertation, p. 125.

[6] Maritime Executive Magazine Young Seafarers' Focus Group Workshop Apr 16th 2009. [Online] Available at http: //www.maritime-executive.com/article/intertanko-itf-hold-young-seafarers-focus-group-workshop/. [Accessed 18th May 2009].

[7] Smith, P., 2009. The Cadet Experience. MSc Dissertation, p.127.

[8] Bachelors degree in Business, Leadership and management Nautilus Telegraph, 2009. April 2009 Edition, p. 5.

[9] Smith, P., 2009. The Cadet Experience. MSc Dissertation, p. 65.

[10] Springett, T., 2008. Chamber of Shipping: Chamber successfully highlights industry skills shortage. 9th September 2008 [Online] Available at http: //www.politics.co.uk/opinion-formers/press-releases/business-and-industry/chamber-of-shipping-chamber-successfully-highlights-industry-skills-shortage-$1239931$364268.htm. [Accessed 18th May 2009].

[11] MOL., 2006. Corporate Statement 16th March 2006. [Online] Available at http: //www.molpower.com/VLCWeb/UINewsAdmin/ViewNews.aspx?NewsID=20060317115540 [Accessed 18th May 2009].

[12] NYK Line., 2006. News Release 17th May 2006 [Online] Available at http: //www.nyk.com / engliSH/news/2006/0517/index.htm. [Accessed 18th May 2009].

[13] United Nations Economic and Social Commission for Asia and the Pacific. Country Report from Vietnam, 2000. [Online] Available at http: //www.unescap.org /ttdw/ Publications/TFS_pubs /Pub_2079/Pub_2079_VietNam.pdf. [Accessed 18th May 2009].

[14] Championing the Seafarers. United Filipino Seafarer's Union , 2004. [Online] Available at http: //www.ufs.ph/tinig/novdec04/11120401.html. [Accessed 18th May 2009].

[15] John, K., 2009. Ports are the driver for economic development // Fairplay Vol 365 12th Feb 2009, p. 31.

[16] Barnett, M., 1997. The use of simulators as tools for training and examining seafarers. MET A Practical Guide p. 77. Nautical Institute.

[17] Brady, P., 2008. STCW Review must "meet new challenges" Safety at Sea International June 2008, p. 13. Lloyds Register – Fairplay.

[18] Storeng, T., 2009. Storeng on Safety. Safety at Sea. March 2009, p. 29.

[19] Wilkins, T., 2009. Update on Intertanko's TOTS. Seagull Users Seminar 4th March 2009. [Online] Available at http://www.intertanko.com/upload/SeagullSeminaronTOTS.ppt # 292,1, Slide 1. [Accessed 18th May 2009].

[20] Bardot, A., 2007. Shortage of Mariners Raises Concern that Shipping Casualties will Rise. The Christian Science Monitor. 16th November 2007. [Online] Available at http: //www.csmonitor.com/2007/1116/p02s02-usec.html [Accessed 18th May 2009].

[21] Whitcher, A., 2008. Warsash Refines Formula for Success LNG World Shipping Journal August September 2008, p. 74.

[22] Dawson, I. K., 2008. MSc Worldwide Maritime Technology Ltd "Training with Innovation – Get it in writing"– LNG World Shipping Journal August / September 2008, p. 60.

[23] Urban, C., 2008. Depth and Balance at SUNY LNG World Shipping Journal August / September 2008, p. 63.

[24] Veierland, S. E., 2008. Konsberg Integrates its Simulators and Cargo Control Systems LNG World Shipping Journal August / September 2008, p. 67.

[25] MCA Reprieve for CoC Oral Examinations. Nautilus Telegraph. February 2009, p. 2.

NEW DEVELOPMENT OF COMPETENCIES FOR YOUNGER LECTURERS ACCORDING TO STCW AND TRAINING SYSTEM REQUIREMENTS

P. Arsenie,
Prof. Assoc., PhD
R. Hanzu-Pazara,
Lecturer, PhD
F. Surugiu,
Lecturer, PhD
Constanta Maritime University
E-mail: raduhanzu@yahoo.com

Abstract. In the past, the maritime education has based on the experience of lecturers with different specializations in maritime field, former deck and engine officers. Today, age of lecturers interests in academic field start to decrease, many of these beginning their career right after finishing the studies. In this case, the competence background for students training is based only on the knowledge added during the studying years. To cover this deficiency, maritime universities have to develop programs to train the trainers, based on requirements of international standards and in force Conventions, mainly by STCW Convention, and also based on the calls of educational system to acquire specialized personnel in institutions. In this light, Constanta Maritime University, developed last year a project dedicated to the improvement of competencies for younger lecturers and also to up gradation of skills for experienced lecturers. A significant part of this project is designed to form competencies according to STCW Convention requirements for lecturers who will teach knowledge regarding navigation, ship handling, cargo handling and ship engine. The present paper shows the way these training procedures will improve the competencies and skills of younger lecturers in order to provide more competent officers for the world fleet.

INTRODUCTION

Today, the maritime industry is in a continuous development process. Last generation ships reach an automatic and computerized level difficult to be imaged twenty years ago. Human work onboard decreases in volume but become more complex and strain due to technologies involved in navigation and engine activities, technologies which request a higher level of knowledge and training and new competencies for duty. Beside the technology evolution onboard ships, regulations and rules have changed, becoming more elaborated and requesting for applying familiarized and well known persons. All of these bring the necessity of more trained personnel onboard with skills in concordance with the ship equipment and designation.

Taking account all these changes produce in ship design and onboard equipments, development of new training processes and competencies have necessary to be creates in time. To assure the coverage of the latest maritime industry requirements, the training institutions have been oblige to change or provide new curricula's according with industry improvement and development. These curricula changes have imposed development of new training competencies and new or special trained trainers, capable to understand and provide specialized training to onboard personnel. New directions have appeared, like use of simulators and computerized programs in the training process, all of these requesting trainers able to work with them. Many of the newest training equipments have imposed by the International Maritime Organization and European Commission, through a number of directives, as compulsory in the training of the already and future bridge and engine officers.

As part of the training system, maritime academics must accomplish endowment with simulators and operational software programs, to provide right lecturers to perform on these equipments or, if have not in own staff, to bring in the system new persons. Where the solution found has to bring new persons in the system, many of the new lecturers come from the graduates or former graduates after a number of onboard duty years. The new arrivals have the advantage of a good knowledge of the new technologies, they living in a high technology era, but needs training to become a good student's trainer, mainly to provide training according with the industrial field requirements and with the academic aspirations.

THE TRAINING PROCESS AND MARITIME INDUSTRY REQUIREMENTS

Now, after the ships have been modernized, armed with computerized equipments and high technology in order to provide a safety operation, to increase protection of the human life and of the environment, is the time to improve people capabilities.

These requests can be solved through a better learning and a training period before taking responsibilities onboard. During this period, they must be teach about new ship types, their characteristic operations, the differences between different types, about technology already onboard, configuration and operation, situations which can be met during a voyage, organizing and managing of onboard activities and duties and about everything is necessary to provide a rightful and safe activity.

This is in our duties, as academic staff, to satisfy the present requests and necessities of the maritime industry, to provide people, both deck and engine officers able to work and react in different conditions and situations encountered during activity.

The maritime universities have important duties and responsibilities near the maritime activities. The maritime academics do not have only one role, that of training, they are also formative institutions for maritime officers, including personality modeling and developing a responsible behavior of their actions. Is human nature to borrow from other people's personalities, from teachers or trainers in these cases. Being examples, the teachers have to show only the better part of their personality, oriented on their professional knowledge and skills and to correct the intention of the trainees to become a copy, to help them develop their own personality, based on a model.

For this, is important for teachers to use in the training process their experience in working with people, to complete theoretical knowledge with practical examples and advices. To do these is necessary that teachers to possess an adequate level of training and to have knowledge's from domains complementary to their teaching area. These can be achieved from their start in teaching activity in the academic field or in time through periodical updates.

Trainers trained from the beginning of their academic carrier, is a more acceptable condition, they having still fresh the theoretical knowledge acquired during studies period. It will be necessary just to familiarized them with the teaching techniques, how to use different teaching materials and learn them to touch the maximal goal, in order to have at the end good prepared people for their future professional life. For teachers with years of activity in the training process, the scope is to keep them in line with technological development, to convince them to pass from classical teaching methods to the new ones, to include in their activity the use of computerized and simulated application, also distant open learning and e-learning concepts.

Starting from these ideas, Constanta Maritime University developed a project addressed to lecturers, new in domain or experienced; inside of it, has been created a curricula of courses based on actual requests for training level of trainers. The generated courses are focus on techniques and methods for conception of teaching materials, to involve latest technology in the teaching process, to develop new methods of approach between students and lecturers, how to facilitate the interaction between them at class in order to stimulate students'. Another important section of the present project is dedicated to involve younger lecturers in the teaching process of the mandatory IMO courses for deck and engine officers. Taking account the particularity of these courses and requirements for trainers aptitudes, during the project, younger lecturers will follow special courses in order to certify them as IMO trainers and competencies evaluators.

YOUNGER LECTURERS' COMPETENCIES DEVELOPMENT PROJECT - CONCEPTS AND DEVELOPMENT

The general objective of the project is represented by multidisciplinary researches concerning initial and continuous formative of the lecturers from maritime universities and providing of advancement programs according with the maritime industry requirements.

Achieving of this objective will lead to increasing of maritime lecturers competencies and also will make attractive for graduates to come in the system.

According with equal chances concept, can be observed, that in an activity domain dominated by the male, attendance of females is not treat as abnormality. As long women are presented onboard ships, in many cases in managerial position, their presence in the maritime universities is not treated with skepticism.

The development of the maritime industry imposes the implementation of a framework for providing of advancing programs due to continue changing of this activity domain.

To achieve the project general objectives, specifically objectives are generated, as:

- Increasing of lecturers competencies through promotion of knowledge's and technologies in the academic maritime field.
- Creation of a development, update and on-line management framework for initial and continue formative of the human resources.
- Realizing of studies and analyze to define formative programs dedicated and an optimum correlation of these with maritime industry necessities.
- Increasing of access and participation of lecturers to formative programs and to obtain a double qualification.
- Encouraging of lecturers to maintain a high qualification level through participation at specialized courses.
- Introduction of carrier advancing opportunities for younger lecturers.
- Verifying of the process and teaching activities through initial and continue formative programs in scope of improvement of TIC using level.

All these objectives are based on premise than continue learning is the main condition for restructuring and development of educational and formative systems, for assuring of decisive competencies during life and to realize the coherency between persons involved in maritime academic system.The project square up many horizontal objectives as durable development, innovation needs and transnational approach.

Durable development has as scope the give up of traditional methods for lecturers formative. Will be followed the alignment to actual and future requirements of the international maritime market, the expected result being represented by a next generation of competitive seagoing officers. The formative objectives will be not state just in theory, it will be extend to objectives focused on knowledge, action, cohabitation, personal and social innovation. In this scope will be taken in consideration economical aspects, problems regarding environment protection, right manage of human resources, all of these resulting in promotion of a durable global development.

This project tries to involve maritime lecturers in international maritime transport framework, to put them in direct contact with the end users of their work, the companies from maritime industries and to know exactly their needs. The international maritime companies are the necessary source of information's regarding worldwide requests for employ of maritime personnel.

Collaboration with partners from maritime field, as project objective, will be found on communication and information changes to identify and implement of adequate modalities to increase the number of work places and to optimize these.

Initial and continue formative activities for academic staff supposed training in modern teaching techniques, IT domain, simulation applications and in human resources management.

The courses generate for younger lecturers will cover areas of interest as "Teaching curricula development", "Using of simulation techniques during training process", "Advanced concepts in virtual learning method", "Human resources management in maritime academic", "Maritime academic system development in knowledge management context", "Use of new technologies for research purpose".

These courses have importance in the context of changes in the maritime training system, where in the present it seen the tendencies to pass from theoretical base to theory-practice combination.

"Teaching curricula development" is a course dedicated to familiarize younger lecturers with actual premise requested by maritime field curricula which must contain IMO requirements, as compulsory, also new elements imposed by technical development in the sector. Here are explains modalities of curricula conception, contents, compulsory elements, hours repartition on course and practice, detailing of each course and practice class, trainer and trainee manual elements, use of electronic course development and ways to be delivered to the trainees and other aspects characteristic to each curricula.

Second course developed, is one of the principals, here is describes the actual simulators used in the training process and present in the university possession. There are included simulators of ship handling and navigation, liquid cargo operation, engine operation and crisis situations.

Simulators are new teaching techniques introduced in the training process. Once appear these request persons trained for their use. The increased necessity of simulator training asks for more persons able to use it. For this, younger lecturers can be the ideal solution to become simulator trainers and the present project course let them to enter in this area of training and provide knowledge's and practice in simulation.

"Advanced concepts in virtual learning method" is a course created according with the European initiative to improve the education system through a better communication between actors using the advantages offer by the latest technologies, the virtual world. The concept develop in this course is over the present idea of virtual learning, treat as a web based systems, where are posted materials with scope to be downloaded or accessed to be read on the web. The next level in this trend is to create the "virtual teacher", a technology based on interaction between teachers and students on a virtual platform.

Human resources concept in the present project is build on actual strategies in the maritime academic regarding management principals of human elements. The system changes made in the last period affect also the human resources manage, dividing personnel in sectors of activities, as teaching and research areas. Management of resources in teaching area supposed capabilities to organize academic staff on university curricula, to nominate right trained person to according course, to lead activities during course period, including student management on curricula activities.

Knowledge management represented a creation, maintain and consolidation process of knowledge's inside of an organization, for their use in the most adequate modalities to create values and to generate competitive advantages.

Knowledge management system is a specific technological system designed for the management of functional bringing in of distributed elements of hardware, software and network compounds in a single functional unit, which sustains knowledge production, acquisition and transfer processes inside one organization. In order to realize this design of knowledge management system in a virtual community is imperative to have a profound understanding of cooperation inside groups or organizations, this implying both artifacts and social conventions. This field consists beside computer sciences (knowledge engineering, distributed artificial intelligence, user interfaces) of some other disciplines: psychology, ergonomics, linguistics, sociology, organizational and management sciences.

At the end, but not in the last, the research activities are very important in lecturer formation and to this the project includes elements to help our younger colleagues to become good researchers. The scientific activities are based on the technological advance and the use of these is essential in many research fields. To be able to initiate and complete a research project suppose to know necessary technologies for it scope. Also are included techniques of research, ways to realize it and how to evaluate results in order to disseminate realizations to the scientific world.

Through this project is expected to create competencies for younger maritime lecturers and to improve the competencies of the older lecturer's.

The creation of courses bilingual, Romanian and English, permit other lecturer from national and foreign universities, maritime particular, to take part to these with impact in the number of persons included in the program.

Taking acknowledge of materials contained dedicated to initial and continue formative of maritime lecturers and after to reply with own evaluation, consideration and proposals for improvement of courses will lead to a better correlation of lecturers competencies with maritime industry needs.

CONCLUSIONS

The world economy is changing, the maritime industry, as part of it, is changing too and the requirements and necessities are remodeled. To achieve these new challenges is necessary to redesign the training system, the approach principles and people involved.

It will not be easy to change the actual format of maritime training system, mentalities or main topics approach. The transition must be started from the new lecturer's generation and completed with older lecturers through programs for initial and continue formation.

This program's idea has the advantage of mobility, the ability to reach to different generations, to shape up the content according to present requirements and to apply that parallel with the daily activities. Being based on printed and virtual components, it can be accessed by own personnel and by the outside personnel, from other universities or from economic field on interesting fields.

The courses developed in the project are created in the actual trend of maritime education and come to help lecturers to improve their competencies or to create new ones, particularly those related to the use of latest technologies, computerized and simulation procedures.The actuality of designed courses has been proven by the international interest in achieving of latest techniques inside the teaching process.

The competencies and qualification achieved at the end of the teaching processes contained the project, will make the maritime academic system more attractive, with competent personnel and able to provide to the maritime industry, well trained officers to face the new realities in the field.

References

[1] Barsan. E. (2006), Bridge and engine room teams cooperation, in loss of remote control scenarios, International Navigational Simulator Lecturers Conference Proceedings, Algraphy S.N.C. Publisher, Genova, Italy, 2006.

[2] Decision No 1145/2002/EC of the European Parliament and of the Council of 10 June 2002 on Community incentive measures in the field of employment, Official Journal of European Union, 2002.

[3] Decision No. 1720/2006/EC of The European Parliament and of The Council, Establishing an action programme in the field of lifelong learning, Official Journal of European Union, 2006.

[4] Niculescu, C., Knowledge Management: approaches and tendencies, Integrating Distance Learning in Knowledge Management, Proc. intern. symp., Bucharest, 2003.

TECHNICAL COMMUNICATIONS – A PRECURSOR TO INTERNATIONAL COLLABORATION IN MARITIME RESEARCH AND DEVELOPMENT

Paul A. Wlodkowski,
PhD., Associate Professor
Marine Systems Engineering, Maine Maritime Academy
Castine, Maine, 04420, USA
E-mail: paul.wlodkowski@mma.edu

Abstract. In the twenty first century, the role of undergraduate research and development (R&D) - particularly in the scientific and technical disciplines – is becoming increasingly significant. Maritime universities, while distinguished by mission and culture, are actively seeking avenues to contribute towards innovation and growth in their industry. To participate in these R&D endeavors, maritime academies often form strategic alliances with large research universities and institutes to work in the traditional fields of marine engineering, naval architecture, and now in the burgeoning area of renewable energy sources. Yet global problems often warrant international collaboration, and here success is predicated on the ability of each maritime university to engage in effective technical communications. This includes specific training in the preparation of cover letters, resumes, technical documents and reports, communication of calculations, proposals, as well as oral and visual communication. In May 2008, an initiative was launched by the Maine Maritime Academy (MMA) and the Admiral Makarov State Maritime Academy (AMSMA). The first phase of this collaboration featured a visiting MMA professor who delivered a course in technical communications (in both English and Russian) on the AMSMA campus. In the Fall 2010 semester, an AMSMA professor will visit the MMA campus to teach traditional engineering courses and to participate in on-going research projects. The objective of this collaboration, under the aegis of technical communications, is to promote greater faculty and student exchanges among the International Association of Maritime Universities (IAMU).

INTRODUCTION

Throughout the world, many college students garner a valuable learning experience through foreign study programs. In most cases, the academic semester abroad requires proficiency or fluency in a foreign language. Students often complete several years of language training at their college before embarking on a term of full immersion in the language and culture of the host institution. While many students pursue this opportunity as part of their major field of study, e.g. literature or history, a number utilize the semester abroad as an enriching academic experience that will complement their training in engineering, business, or other technical disciplines. In this respect, the International Association of Maritime Universities (IAMU) has a tremendous opportunity to expand student exchanges and foreign study programs, which in doing so, will broaden the appeal of the sister IAMU institutions to prospective students and will enhance the quality of maritime education.

The author recognized that proficiency and fluency in a number of foreign languages was present on the campus of Maine Maritime Academy (MMA), as spoken by faculty, staff, and students. This list includes Spanish, French, German, Chinese, Persian, Japanese, Russian, and Arabic. He also observed a strong demand on the part of MMA's engineering students to learn a foreign language and to participate in a semester abroad, either as a student or in fulfillment of the cooperative industrial field experience [1]. Recalling his own foreign study experience at Moscow State University, as part of an exchange with Dartmouth College, the author set out to establish collaboration between MMA and the Admiral Makarov State Maritime Academy (AMSMA).

In October 2007, Paul Wlodkowski, Associate Professor and Head of the MMA Marine Systems Engineering program, and Elena Kozlova, Head of the AMSMA International Relations Department, began work on establishing the framework of this IAMU exchange program. After a series of meetings during a preliminary visit to St. Petersburg, Russia in March 2008, it was decided to develop a specialized course for AMSMA engineering students in technical communications, which would be delivered in both English and Russian.

The motivation and rationale of this effort is also reflected in the imperative to provide a global education for engineers, in general. Many prominent educators and industry leaders are calling for the engineering profession to be re-engineered. The Newport Declaration calls for "all engineering students to develop the skills and attitudes necessary to interact successfully with people from other cultural and national environments" [2]. Accordingly, because of the international nature of the maritime industry, and the increasing role of undergraduate research and development (R&D), it will be necessary to forge strategic alliances with universities at home and abroad for the purposes of solving global problems. For these ventures to be successful, however, IAMU institutions will need to engage in effective technical communications.

TEACHING TECHNICAL COMMUNICATIONS

The great American writer and lecturer Dale Carnegie [3] often said that professional success is attributable to 15 % technical skills and 85 % interpersonal and communications skills. Proceeding from this philosophical underpinning, the instructor of technical communications stresses that the skills of presenting designs, equations, and technical ideas are just as important as the science and mathematics behind them. While many recognize that the corporate sales and marketing personnel are tasked with communicating the organization's message externally, fewer appreciate that the engineers are the consummate internal communicators who must first advance their ideas over competing proposals. Inculcating the importance of technical communications to a marine engineering student's future career is critical albeit a challenging task.

Technical writing differs significantly from other conventional forms due to the necessity of communicating calculations, charts, graphs, schematic drawings, and mathematical equations. For these reasons, and because its objectives are to secure employment, to explain sophisticated technical information to a general public, or to advance proposals, it is a distinct discipline that needs to be studied and constantly practiced [4]. One of the major themes of technical communications is the "reader-centered approach" in which the student learns to analyze the wider corporate audience, to concentrate on persuasive strategies, and to focus on the ways multiple readers will respond, moment by moment [5].

During May and June 2008, the author delivered a thirty hour course in technical communications to an audience of fourteen AMSMA cadets and one instructor. Most of the students were enrolled in the Academy's mechanical and electromechanical departments, although several had affiliations with maritime transport management department. Given the technical nature of the course, the AMSMA cadets first had to demonstrate a proficiency in English. To enhance the learning process for the AMSMA cadets, however, the instructor utilized a pedagogy known as language twinning, in which his lectures would lead in English, but subsequent points of clarification, as well as a percentage of the classroom discussion, would be conducted in Russian. Overall, this approach yielded successful results, as evidenced by the quality of the final presentations and course evaluations.

The focus of the AMSMA course was to develop the practice of communications tasks of a working engineer or technologist, with a focus on writing business plans and research proposals. The instructor emphasized the application of effective visual aids to both oral and written communications. The course goals were:

1. To teach students to communicate effectively in professional environments, orally, visually, and in writing, using and understanding the formats most effective for this purpose.
2. To provide students mentored practice in writing and revising technical English.

3. To foster in students the values of responsibility and honesty in the academic setting.

The performance criteria [6] used to assess the cadets is illustrated below in Table 1. In general, the instructor assessed student performance relative to current industrial standards for entry-level engineers, while fully taking into account that English is the second language. Moreover, he evaluated cadet performance based on the following criteria:

– Responsiveness to Audience and Objectives.
– Appropriateness of Format and Form of Argument.
– Quality of Supporting Evidence Presented.
– Appropriate Use of Readability and Accessibility Principles.
– Conformity to Conventions of Standard Technical English.
– Quality and Effectiveness of Visual Aids, where Applicable.

Table 1

Performance Criteria for Technical Communications Course

1. To teach students to communicate effectively in professional environments, orally, visually, and in writing, using and understanding the formats most effective for the purpose; • Understand and employ the basic steps of the technical writing process; • Use rhetorical elements appropriate to the audience and objectives of the communication; • Understand and employ standard formats appropriate to the type of communication; • Apply the principles of technical argumentation and persuasion; • Design document layout and graphics for clarity and information accessibility; • Use electronic media for research and communication with colleagues; • Design and deliver effective oral presentations; • Show proficiency in the conventions of standard technical English.
2. To provide students mentored practice in writing and revising technical English; • Demonstrate examples of an effective technical memorandum, description, proposal, instruction, résumé and employment letter; • Demonstrate the ability to critique technical writings of others in a constructive manner.
3. To foster in students the values of responsibility and honesty in the academic setting. • Attend class regularly and on time; • Recognize and avoid plagiarism; • Use technical communication ethically.

Four major written assignments formed the basis of the course, which are listed in Table 2. As revision is an essential element of the technical writing process, the evaluation of each assignment was based on the results of a draft and final versions. The instructor provided each student with written comments and feedback. Moreover, during several recitations, the cadets were able to obtain further critique and evaluation from peer reviews.

Table 2

Homework Assignments for Technical Communications Course

Number	Assignment
1	Submit a copy of your RESUME and a LETTER OF APPLICATION, both "ready to mail" to a specific potential employer
2	Submit a written DESCRIPTION in TECHNICAL MEMO format to the solution of a problem from your engineering or technology curriculum. Utilize equation editor.
3	Submit a TECHNICAL PROPOSAL to introduce an innovation to the maritime field or to the curriculum at AMSMA
4	Prepare and present a 5 – 7 minute ORAL PRESENTATION on the Technical Proposal

The culmination of the technical communications course was preparing and delivering a 5 – 7 minute oral presentation on a technical topic approved by the instructor. This presentation went beyond the conventional "how-to" or "show and tell" format. Cadets were asked to develop well organized and cogent technical proposals, feasibility studies, technical descriptions, or critical reviews on a published article, etc. The presentation included at least one graphic element, and part of the final grade assessed that element's effectiveness and appropriateness. Some of the topics chosen by the AMSMA cadets included the development of specialized cadet shipping programs, the incorporation of metrics to measure the efficiency and quality of a maritime education, the establishment of an all-electronic technical library, the formation of a new training center, as well as ideas to incorporate new types of software in the curriculum. Fig. 1 below illustrates an AMSMA cadet, Aleksey Agarkov, delivering his oral presentation. All students were required to deliver the final presentation in English. In attendance were the AMSMA professors representing several departments, the Head of the International Relations Department, and the Vice Rector for Academic Affairs. After the presentations and question and answer session, the author provided each AMSMA cadet with a certification of successful completion of the technical communications course.

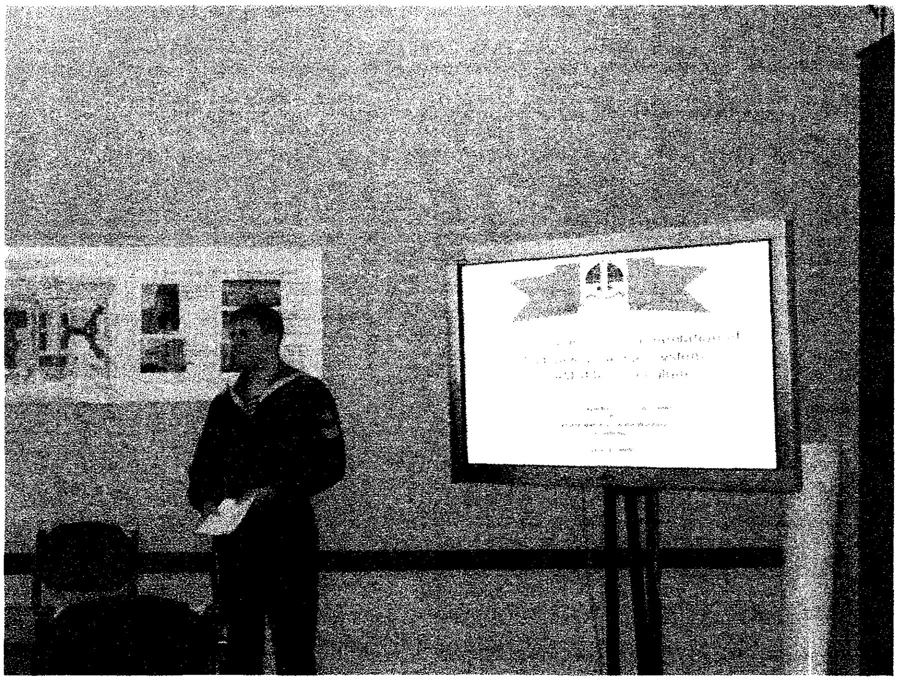


Fig. 1. Delivery of Oral Presentation in Technical Communications at AMSMA

CONCLUSIONS AND FUTURE WORK

The teaching of technical communications on the campus of the Admiral Makarov State Maritime Academy in St. Petersburg, Russia was a productive and rewarding enterprise. By learning to compose resumes and cover letters, and to scope technical projects with Gantt charts, objectives, budgeting, and a detailed communication of calculations, the cadets have acquired a skill set that will be extremely valuable in the business world and in research and development. Moreover, the collaboration established between MMA and AMSMA highlights the effectiveness and utility of dual language delivery (twinning) of technical coursework. It is a model that can be replicated at other maritime academies for a variety of disciplines. Future plans involve expanding this exchange to the students of the Maine Maritime Academy, who would first complete several years of language training in Russian at home prior to their semester abroad term in St. Petersburg.

During the Fall 2010 semester, an AMSMA professor will reside in Castine, Maine as a visiting professor. As MMA is increasingly involved in research and development efforts in tidal power, off-shore wind, and thermoelectric materials for waste heat recovery, this AMSMA professor could well be involved as a technical resource. This, in turn, will likely evolve into an active collaboration of two IAMU institutions working to solve the global problem of developing renewable energy sources for maritime applications. A precursor to the success of this venture will involve full institutional commitment to the teaching and practice of technical communications.

ACKNOWLEDGMENTS

The author would like to thank the Admiral Makarov State Maritime Academy for the enthusiastic reception and gracious hosting of his visiting professorship in St. Petersburg during May and June 2008. Particular appreciation is given to Ms. Elena Y. Kozlova, Head of the AMSMA International Relations Department, for her efforts as an architect of the MMA-AMSMA collaboration and for her work in organizing the offering of this specialized course to a number of academic departments. The author would also like to acknowledge Mr. Dmitry V. Isakov, an AMSMA Instructor from the Electromechanical Department, who both completed the course and made significant contributions to incorporating technical communications into the curriculum. Lastly, thanks go to the AMSMA cadets who diligently completed the rigorous assignments and developed their technical English, and in turn, honed the Russian skills of this visiting professor.

References

[1] Maine Maritime Academy, Undergraduate Catalog, 2007-2009, p. 119.

[2] "A Global Education Urged for Engineers", *Prism: American Society for Engineering Education*, February 2009, p. 37.

[3] Carnegie, D., *How to Win Friends and Influence People*, New York: Simon & Schuster. 1981.

[4] Sorby, S.A. and W.M, Bulleit, *An Engineer's Guide to Technical Communication*, Saddle River, NJ: Pearson Prentice Hall. 2006.

[5] Anderson, P.V., *Technical Communication: A Reader-Centered Approach, 5th ed.*, Boston, MA: Thomson:Wadsworth. 2003.

[6] G. Herrick, Et-452 *Technical Communications*, Maine Maritime Academy, Syllabus (Unpublished) 2002.

TRAINING PARADIGM ASSISTED ACCIDENTS: ARE WE SETTING OUR STUDENTS UP FOR FAILURE?

Samuel R. Pecota,
Captain
James J. Buckley,
Ph.D, Captain
California Maritime Academy
E-mail: Specota@csum.edu

Abstract. Traditional instructional practices developed around early navigation technologies, or even the more current methodologies conforming to the Standards for Training, Certification, and Watchstanding (STCW), may be unintentionally leading maritime school graduates to make mistakes that cause accidents. Official investigations into marine accidents conclude that even if the watch officer, master or pilot has been assessed as competent in the use of the latest navigational equipment, they may still have failed to understand how to use that technology in the context of bridge team management. The purpose of this paper is to examine, in progression, the results of four studies carried out in the bridge simulators at the California Maritime Academy. Specifically, trends will be identified in student watchstanding performance, in their perceptions of the value of the new navigational technology; in how effective they are in using the equipment, and in how they view the adequacy of existing training regimens. This paper should serve to provide guidance to maritime educators in developing effective teaching techniques that support the recently adopted International Maritime Organization's *e*-Navigation concept.

The data suggest that participants understand the importance of formalized training in modern navigational technologies and overwhelmingly prefer that instruction be accomplished through the use of simulation that is introduced much earlier into their program. This suggests a new training paradigm.

INTRODUCTION

Maritime instructional pedagogies developed around early twentieth century navigation technologies still are being used today. Even the current methods used in the instruction and assessments of STCW competencies are based largely on the traditional teaching paradigm. It is this reluctance to change, for whatever reason, that unintentionally may be leading maritime school graduates to make mistakes that can cause groundings or collisions. In fact, there are alarming indications that the rate of maritime casualties resulting from navigational errors may be increasing in spite of the widespread introduction of advanced systems like ECDIS and AIS [19].

Until very recently it was common to navigate a vessel using only celestial navigation, visual bearings, and unsophisticated radars. Bridge-to-Bridge communications, until the advent of radio, were mainly by whistle signals or flashing light; even VHF communications could be fraught with dangerous misunderstandings. Improvements to those technologies were slow in coming and the changes were introduced only incrementally. Today we are enjoying an exponential increase in both the capabilities and availabilities of new technologies intended for use aboard commercial vessels. Some major innovations include instantaneous, world-wide communications through the use of tele-communication satellites, sophisticated radar units that are capable of superimposing vessel identification signals and chart overlays on the radar screen, and integrated navigation systems using electronic chart technologies.

Coincident with (maybe even as a result of) this technological revolution is the changing nature of the typical maritime university student. The students arriving on campuses today are very comfortable with the latest electronic devices. They have grown up with computers, cell phones, and video games and seem to adapt very easily to the constant technological changes that are taking place around them. Sometimes it appears that they are more comfortable operating in and learning from a virtual world than the real world

[4]. Considering these ongoing, exponential changes in technology and the associated modifications to the skill sets and learning preferences of contemporary maritime students, the authors assert that now is the time to institute a paradigm shift in teaching pedagogy that will maximize the utility of these new technologies for the benefit of our students and the industry in which they will serve.

Given this background, the purpose of this paper is to examine the progression of four recent studies that have considered the efficacy of early introduction of the latest navigational technologies into traditional maritime training programs. Specifically this paper will identify trends in student performances with and without the technology, it will identify their perceptions as to the value of the technology, and it will identify how they are making use the equipment. The last two studies were inspired by the recent (2008) completion of the California Maritime Academy's Simulation Center. The simulators contained therein are state-of-the-art and were instrumental in the development of the salient ideas featured in this study. The authors hope that this paper will serve to provide a sense of direction to maritime educators as they attempt to design more effective training regimens in keeping with the recently adopted International Maritime Organization's e-Navigation concept.

1. LITERATURE

The various studies that are being reviewed in this paper, while they all have some characteristics in common, have each examined different aspects of learning theory. Accordingly, this section will include an overview of the educational literature involved.

1.1. Using simulation as a learning tool

The use of bridge simulations to evaluate human factors in the marine environment is a well established practice [14, 21, 23] and provides many benefits over the real-world environment [22]. According to Hertel and Millis [9], simulation can be an effective pedagogical method to (a) transfer discipline-knowledge, (b) develop skills and (c) apply both knowledge and skills. In fact, researchers have determined that students are more motivated to learn technical material when they see the real-world application of the subject [27]. Student perception of the real-world benefits of course material results in a higher motivation. A higher motivation to learn can lead to an increase in ability in the subject area [16].

1.2. Implicit and Explicit Learning

The requirement for skill mastery for Officer-In-Charge of a Navigational Watch (OICNW) is set by the International Maritime Organization (IMO) Standards of Training, Certification and Watchkeeping (STCW) standards. Although each maritime training facility structures its individual curriculum to fit specific needs, the common pedagogy of a classroom teaching process followed by a practice-based learning experience with a reflection period is normally used. Research suggests that this process improves upon classroom education by making the participants more aware of the differences between their beliefs and their actions [13, 17]. This process takes the student from a purely explicit learning experience to a more implicit learning environment.

Although the distinction between explicit (active) and implicit (passive) learning has been widely acknowledged, the complex interaction between the two has not been widely recognized [25]. Recent research has questioned the basic assumption that the learning of a motor skill must follow the standard practice of moving from explicit to implicit [18]. There is some evidence that both explicit and implicit knowledge are useful in producing a required skill behavior. Specifically, the research by Willingham & Goedert-Eschmann [29] suggests that explicit learning supports and governs behavior until the simultaneously acquired implicit knowledge is sufficient to support the behavior on its own. The results of a study by Taylor & Chi [26] suggest that simulation has the potential to enhance implicit learning. A study by Bird, Osman, Saggerson, and Hayes [1] suggests that observational learning is explicit.

Educators must evaluate how to operationalize the differences between explicit and implicit learning to standard educational models. The specific model that will be considered here is the constructivist model.

1.3. Bridge Team Management and error trapping

Automation changes the task it was meant to support; it creates new error pathways, shifts consequences of error further into the future and delays opportunities for error detection and recovery [12]. Maritime instructors should understand that the logical formalization of the ship's navigational process is of great importance for education in maritime navigation [11]. Therefore, both the technical knowledge of the equipment as well as knowledge of its role in bridge team management and bridge resource management is vital to vessel safety and the safety of the marine environment.

United States Coast Guard data show that maritime accidents, such as groundings and collisions, significantly decreased during a recent five year period [28]. Hetherington, Flin & Mearns [10] have attributed this reduction to enhanced navigation technology. However, these results are not consistent with international findings [19]. Regardless, what is true is that despite the use of technology, maritime accidents still do occur and human factors play an important role.

The maritime community has followed the airline industry in developing a methodology for preventing casualties. This methodology is known as bridge resource management (BRM). According to Swift [24], one function of effective BRM, is the interpretation and assimilation of information obtained by the use of modern electronic systems (e.g., ECDIS). The accuracy and reliability of electronic navigation systems must be "cross-checked" by comparing the positions derived by two independent systems such as GPS and radar. An ambiguity in the positions would indicate that an error chain is developing and the bridge team should react in order to break the developing error chain. The process of identifying errors is commonly known as "error trapping."

Studies by Gonin, Dowd and Alexander [8] suggest that ECDIS provides equivalent or greater navigational safety than paper charts and at the same time reduces the navigation workload. In their studies, cross-track error was the primary measure of navigational accuracy. This study reported that the mean cross-track error for mariners navigating using ECDIS was approximately one third of that for mariners without ECDIS who used paper charts and more traditional navigation methods. Exit interviews in the study revealed that mariners felt that ECDIS contributes to safe navigation. These findings were consistent with those of Donderi et al [7].

2. METHODOLOGY

Recent literature does not contain many examples of specific research that investigated pedagogical approaches to navigational instruction with modern technologies. This may be due to the fact that the greatly expanded capabilities of simulation technologies have only recently been introduced and have yet to be fully exploited.

A total of four studies will be reviewed for this paper. The first study was conducted in California Maritime Academy's original full-mission simulator (dismantled in late 2008). The next three studies utilized one of three full-mission or eight part-task simulators in the new Simulator Center at CMA. Although statistically significant results were few, all four studies showed readily identifiable and consistent trends.

2.1. Human Factors - Performance and Perceptions

The first study, by Buckley and Pecota [3], was carried out during October and November of 2007. Students in the advanced simulation course, DL 420 Watchstanding Simulation, volunteered to participate. Participants in this study, all seniors, consisted of a census of all enrolled cadets at CMA who are taking the bridge simulation course (n = 47). The participants met all prerequisites for the course and had previously taken a 35-hour ECDIS course. This pilot study utilized the last two scenarios of the nine-scenario course. The participants chose the team that they were in for the entire course and that did not change during the study. In total, twelve sections participated in two different scenarios.

The first scenario used was Scenario 8 in which the student team is required to navigate a containership from the San Francisco Main Ship Channel to a specified anchorage position in San Francisco Anchorage No. 8. Approximately half of the teams were randomly selected to have access to ECDIS for Scenario 8. The remainder of the teams did not have access to ECDIS during the scenario.

The second scenario used was Scenario 9 in which the student team is required to navigate a tanker from the Bligh Reef light through the Valdez Narrows in Alaska. Each scenario takes approximately 90 minutes to complete and, once started, is run without interruption. Each team was given the same standing orders and had one week to develop a detailed voyage plan for each transit. For Scenario 9, those teams that did not have access to ECDIS during Scenario 8 were given access and those teams that did have access during Scenario 8 were denied access.

During both scenarios, the course instructor used a data sheet to record measurements at predetermined points during the exercise. These measurements provided the source for the quantitative data which have been reported elsewhere [3]. After each exercise, during the debriefing period, participants were given a survey that elicited responses about the performance of his/her group as well as his/her opinions as to the effects of having, or not having, use of ECDIS during the simulation. The survey instrument consisted of a series of five-point Likert-type perception statements about which the participants were asked to indicate the level to which they agreed or disagreed with that statement (1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree).

The primary research hypothesis (null hypothesis) tested for all survey questions in this study was that there is no difference between the perceptions of participants having access to ECDIS and those without access to ECDIS.

A follow-up to this study was conducted in April 2008 using junior Marine Transportation students enrolled concurrently in the courses DL 320 Introduction to Bridge Simulation and NAU 335 ECDIS. DL 320 Scenario 2 “The Minefield” was selected for use in this part of the study. Navigational performance of fifteen student sections were examined first without the use of ECDIS and then with the use of ECDIS. Performance was based on measurement of cross track error and off-course measurements at certain points throughout the scenario. This study produced the most statistically significant quantitative results of all the study experiments.

2.2. Navigation Study

The second study, carried out Buckley and Pecota [6] during the fall semester of 2008, considered different pedagogical methods for teaching navigation. All volunteer participants (n = 21) were sophomores registered in their first navigation course. The exercises they participated in for this study each took place after they had first covered the material in class with their course instructor. (The navigation instructor was not privy to information about the study other than that it was being conducted. The instructor had no knowledge of which of his students were research participants.) The purpose of this study was to examine the effect, if any, on participant learning and understanding derived from adding simulation, with advanced electronic navigation capability, into a basic navigation class. During this study, participants were divided between three separate treatment groups; traditional navigation lab, non-traditional navigation lab, and navigation lab utilizing full-mission bridge simulators. Each of the treatment groups did the same exercise in the same time period and the participants all completed the pre- and post-test for each study experiment. As part of the post-exercise survey, participants in all experiments completed a qualitative questionnaire designed on a seven-point Likert-type range. The primary research hypothesis (null hypothesis) to be tested for all questions was that there is no difference between the treatment groups. The study also looked at the extent to which implicit and explicit learning took place.

In the first study experiment, participants were asked to plot fixes using visual bearings at 20-minute intervals and then answer relevant questions about those fixes. During this experiment, participants were divided between three separate treatment groups; traditional navigation lab, non-traditional navigation lab, and navigation lab utilizing full-mission bridge simulators. The traditional navigation lab consisted of the standard paper plot that has been the practice in the course. The non-traditional lab consisted of the standard paper plot along with some observational learning in the form of screen-capture shots of both the radar and ECDIS at appropriate time intervals. Finally, the full-mission simulators were used for the experiments. Each of the treatment groups did the same exercise in the same time period and the participants all completed the pre-test, post-test, and survey for each study experiment.

In the second study experiment, participants we asked to plot fixes using various combinations of visual bearings, radar bearings or radar ranges at 12-minute intervals and answer relevant questions about those fixes. During the second experiment, participants were divided between two separate treatments; non-traditional navigation lab and navigation lab utilizing full-mission bridge simulators.

Finally, in the third experiment, participants were asked to plot fixes, using a combination of techniques, and to determine the set and drift of the current. They then calculated the new course to steer to correct for that current. During the third experiment, all participants were utilizing the full-mission bridge simulators.

2.3. Rules Study

The third study, also carried out by Buckley and Pecota [5] during the fall semester of 2008, considered different pedagogical methods for teaching Rules of the Road. All volunteer participants (n = 16) were sophomores registered in the Rules of the Road course NAU 305. This course, which is the only formal course on the International Regulations for Preventing Collisions at Sea in the Marine Transportation curriculum, introduces students to the basics of the responsibilities of ships in maneuvering situations. The population for this experiment was a census of all enrolled cadets at CMA who were taking the Rules course during the fall semester of 2008 (N = 95). All the participants met the prerequisites for the course and some were enrolled concurrently in a radar course.

As with the Navigation study, the research experiments for this study each took place after the participants had first covered the requisite material in class with their course instructor. During this study, participants were divided between three separate treatment groups; traditional lab, and a lab utilizing a full-mission simulator, and a lab using part task simulators. Each of the treatment groups did the same exercise in the same time period and the participants all completed the pre-test and post-test for each study experiment. As part of the post-exercise survey, participants in all experiments completed a qualitative questionnaire designed on a seven-point Likert-type range. The primary research hypothesis (null hypothesis) tested for all questions were that there is no difference between the treatment groups. The study also looked at the extent to which implicit and explicit learning took place.

In all, three separate study experiments were developed. In the first study experiment, participants were asked to make collision avoidance decisions in each of three scenarios involving the steering and sailing rules concerning the meeting, overtaking and crossing situations. During this experiment, participants were divided between three separate treatment groups; traditional rules lecture, full-mission bridge simulator and part task (IBEST) simulators. The traditional rules lecture consisted of a discussion of the practical applications of Rules 13, 14, and 15 using an animated PowerPoint presentation. The full-mission and IBEST simulators were used to allow some participants to maneuver their vessels for collision avoidance by applying Rules 13, 14, and 15 as appropriate. All participants completed the pre- and post-test for each study experiment. As part of the post-exercise survey, participants in all experiments completed a qualitative questionnaire designed on a seven-point Likert-type range.

Participants were asked to indicate the extent to which they either agreed or disagreed with each perceptual statement.

In the second study experiment, participants in the traditional treatment were given a PowerPoint lecture and subsequent discussion on the application of Rule 19, conduct of vessel in restricted visibility. Participants using the simulators were again divided between two separate treatments, full-mission simulator and IBEST simulators. The simulation groups again had three separate scenarios to deal with involving a vessel forward of the beam, abaft the beam and lastly, no detectable vessel at all on the radar. Pre- and post-tests were administered to all participants as well as post-exercise surveys.

In the third experiment, all participants were placed in the either the full-mission simulator or IBEST simulators. In the first scenario, participants' vessels were stationary at night in open waters. No maneuvering was required. Participants were asked to identify the rules situation and identification of various passing vessels by observing their running lights. In the second scenario, also at night, participants were required to navigate their vessels safely past other target vessels in New York harbor from The Battery outbound to the Verrazano Narrows. As in the previous two sessions, pre-tests, post-tests, and post-experiment surveys were administered.

2.4. Error-Trapping Study

The fourth study, by Browne and Buckley [2] was also carried out during the fall semester of 2008, investigated the extent to which bridge teams could successfully identify and trap errors that were introduced into their ECDIS. All volunteer participants (n = 52) were seniors registered in DL 420 Bridge Watchstanding Simulation. During the study, the thirteen sections (4 people per section) participated in four different simulation scenarios. This study utilized the final four scenarios of the nine-scenario course. In the first five scenarios of the course, prior to the commencement of the current study, the watch teams were denied the use of ECDIS and GPS for navigation. Instead, they had to rely on the more traditional navigation techniques of visual and radar piloting to fix their position. For the final four scenarios, the ones examined in this experiment, the students were allowed to use ECDIS and GPS for navigation. Half of the teams had either a gyro or a GPS error introduced into their ECDIS. The primary research hypothesis (null hypothesis) to be tested for all questions is that there is no difference in performance between the teams with no error and those with an error.

Prior to the commencement of the first scenario of the study, the participants were reminded by their instructors that they should not abandon the traditional methods of position fixing because electronic aids to navigation can be subject to failure and errors. The principles of navigation cross-checking were also reviewed. The participants were not told beforehand the purpose of the study. They were not aware that equipment errors were going to be purposely induced for some teams at times previously selected by the researchers.

The first scenario used in the study was Scenario 6 of the course in which the teams were required to navigate a tanker in ballast from a position abeam East Brother Island in the San Francisco Bay to the Golden Gate Bridge, outbound for sea. In Scenario 7, which is also set in San Francisco Bay, the teams were required to navigate a tanker from the Richmond Long Wharf outbound for sea. In Scenario 8 the teams were tasked to navigate a containership from the San Francisco Main Ship Channel to a specified anchorage position in San Francisco Anchorage No. 8. Scenario 9, the final scenario of the course and the study, required the teams to navigate a tanker from the Bligh Reef light through the Valdez Narrows in Alaska.

No equipment errors were imposed during Scenario 6. For the remaining three scenarios approximately half of the teams were randomly selected to receive induced equipment errors while the other half received no errors. Of those teams that received errors at a pre-designated point, approximately half of the teams, randomly selected, received a GPS offset error, in which the accuracy of the GPS position input to the ECDIS was slowly degraded until a position error of 0.3 nm was reached. The remaining teams received a gyrocompass error in which the vessel's heading input was slowly degraded until a heading error of 60 degrees was reached.

Prior to the commencement of the scenarios, the participants entered their pre-computed voyage plan into the bridge simulator Transas ECDIS with a preset cross track error (XTE) limit of 0.1 nm. The teams were instructed to stay as close as possible to the planned track and that if they should depart from the planned XTE limits, they should return within the limits as soon as possible.

For each team, data were collected on the number of times the vessel departed the XTE limits, the distance the XTE was exceeded (in nautical miles) and the length of time the vessel was outside the limits (in minutes). For scenarios 7, 8 and 9, the data were recorded for the 30 minute period prior to the point in the scenario that the error was planned to be introduced to some of the watch teams, and for the 30 minutes following the error. For Scenario 6, because no teams received errors, the data were collected over two consecutive 30 minute blocks of time during the exercise.

3. RESULTS

3.1. Human Factors - Performance and Perceptions

This experiment was an important first step in understanding the complexities of integrating ECDIS into bridge team management. Prior to conducting this study, we expected that the participants with access to ECDIS would have the perception that they had better situational awareness, task prioritization, more confidence, improved vessel handling and better overall team performance than those teams without access to the technology. It was also expected that the participants without access to ECDIS would have the perception that had they had access to ECDIS their performance in those areas would have improved. In general, the data affirmed those expectations with several being statistically significant. These findings were consistent with Donderi et al. [7], Smith et al. [22] and Gonin et al. [8].

In both the original experiment and the follow-on experiment, navigational performance of the groups using ECDIS was generally better than those who were not allowed to use ECDIS. In Scenario 8 of the first experiment, for example, anchoring accuracy was markedly improved (see Fig. 1). In the follow-on experiment, the teams using ECDIS showed significantly reduced cross track errors, fewer groundings and collisions, and generally improved situational awareness (see Fig. 2).

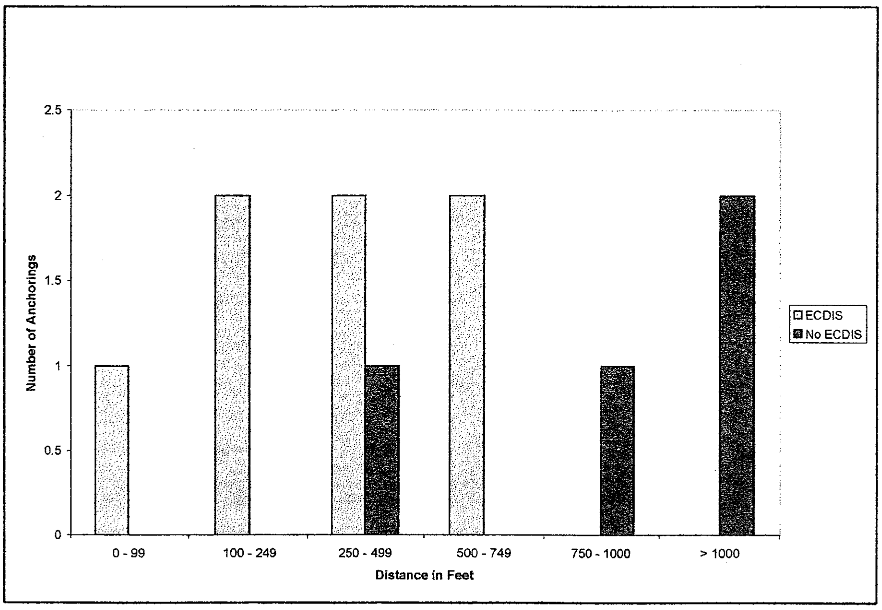


Fig. 1. Scenario 8. Anchoring Accuracy

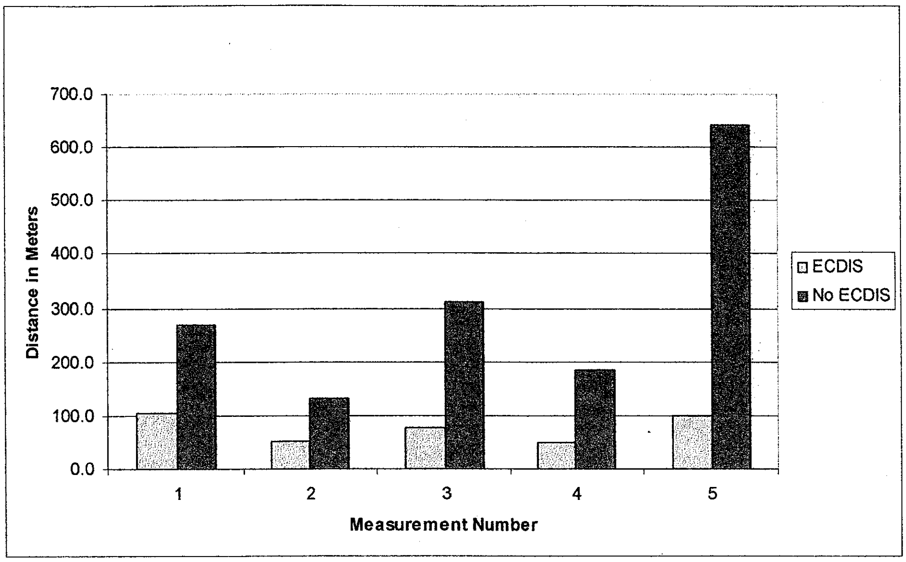


Fig. 2. Cross Track Error from Centerline (Northbound)

The results of the qualitative surveys administered in both the original experiment and the follow-on experiment showed that participant perceptions of their overall performance with ECDIS to be much better than when without ECDIS. The quantitative data, however, did not show such a strong correlation in every case. In essence, the use of ECDIS did not help their performance as much as they thought. One reason for this, and perhaps the most important discovery to come out of these experiments, was that the participants' implementation of ECDIS was uneven at best, detrimental at worst. There seemed to be a uniform lack of protocol or method in the participants' utilization of this relatively new navigational device. This somewhat surprising result led the authors to the conclusion that existing navigational training programs may need to be completely revised to teach maritime students the proper use of these advanced technologies.

3.2. Navigation Study

One of the many objectives of this study was to determine if the participants could learn something about radar and ECDIS implicitly through use of the simulator in basic navigation exercises. As expected, implicit learning did take place, but less implicit learning took place in the traditional lab than in any other treatment. Although the differences were not statistically significant the trend was clear and consistent. The participants in the non-traditional labs did have an increase in implicit learning that may be attributable to the screen-capture shots, but interestingly, their perception was that they did not. Observation learning, as Bird, Osman, Saggerson, & Heyes [1] suggest, may engage the same learning process as physical practice of the observed actions but the findings in the study are inconclusive.

The participants in all of the experiment groups felt that the classroom lessons were easily translated to the simulators. However, each of the three study experiments covered different subjects and there were differences, some statistically significant, in the strength of the participants' feelings depending on the subject. This would suggest that it may not be appropriate to teach all subjects in the simulator. There is evidence to suggest that by using observational learning techniques and bridge simulators in professional courses that traditionally have not used these methods there is an opportunity to take advantage of, and maximize, both explicit and implicit learning. When the quantitative data is combined with participant perceptions and written comments they form a pretty convincing picture.

The most statistically significant information to come out of this study is the very strong opinion by nearly all participants that simulation and the early introduction of ECDIS and radar, in their education are very highly valued. In nearly every case on the post simulation questionnaire, when asked if ECDIS and radar helped participants in their navigation, the overwhelming response was positive.

3.3. Rules Study

As with the parallel navigation study discussed above, this study sought to determine the extent of participants' implicit learning of radar and ECDIS through the use of simulation in a Rules of the Road exercise. The study was also meant to investigate the effectiveness of simulation training in Rules of the Road instruction and those are the study results presented here.

In the first experiment, the participants in the simulation groups were asked to maneuver their vessel in meeting, crossing and overtaking situations based on their knowledge of the Rules. Although all the participants had just covered Rules 13, 14, and 15 in their class and taken an exam on the subject, their ability to translate those rules to the practical situations presented in the simulator was poor. When presented with a Head-on situation on the high seas, more participants chose to turn left (in violation of Rule 14) than turned right. Similarly, when faced with a vessel crossing from starboard to port, some participants chose to speed up or turn left, in violation of Rule 15. When asked later by the researchers if they knew what those rules required in those situations, the participants answered correctly; they simply did not choose the correct action when faced with a realistic situation and limited time to make a decision. This seems to suggest a disconnect between their theoretical learning and the practical application of that knowledge.

In the second experiment involving Rule 19 and restricted visibility, the performance of the participants in the simulator was somewhat better. At least one-half of the participants were taking the radar class concurrently, and most of them were able to apply Rule 19 correctly during an encounter with a single radar contact involving risk of collision. Interestingly though, in the third scenario, the participants were told that the lookout reported hearing a fog signal ahead. There was no actual contact visible on the radar scope in this case. The proper response to this situation was to take all way off but not one of the participants did so. Again, this suggest a disconnect between their theoretical learning and the practical application of that knowledge.

The last experiment was perhaps the most interesting. In the first part, participants were asked to identify the lights of vessels passing close to their vessel which was dead in the water. In addition, participants were asked what their obligation under the Rules would have been if their vessel had been making way. Almost all the participants answered correctly both the light-recognition questions and either the Steering-and-Sailing or Responsibilities-between-Vessels questions. The second part of the last experiment placed each participant on a small tanker at night in New York Harbor. The starting point was abeam The Battery on Lower Manhattan; the end point was the Verrazano Narrows. All eight participants successfully navigated their vessel outbound using radar, ECDIS and visual means. There were no problems during close encounters with several other target vessels. All participants adhered to the Rules and there were no near collisions or groundings.

Examination of the survey questions after each experiment showed an overwhelmingly positive participant appreciation for the use of simulation in Rules of the Road training. Some of the participant's written comments indicated a strong belief that even over the relatively short duration of this study, their knowledge in Rules-of-the-Road application was greatly enhanced.

3.4. Error-Trapping Study

Each of the scenarios in this study differed significantly. As a result, it was not possible to compare performances between the scenarios. Within each scenario it was possible to look at the difference in performance between teams that did not experience errors and those that did. The data concerning the mean number of times outside the XTE limits, the mean maximum distance outside of the XTE limits, and the time outside the XTE limits, suggests that there are no statistical differences in the performance of the teams that experienced a GPS error and those that experienced a gyro compass error in any of the scenarios.

Although the findings were not statistically significant, the trend was quite clear. For Scenarios 7, 8, and 9 there was a noticeable and consistent deterioration in performance for all teams (with and without errors) for the period of time after the error was introduced in some teams. The teams with the introduced errors performed numerically worse than the teams without errors after the introduction of the error, especially in the amount of time outside the XTE limits. In Scenarios 7 and 9 the trend showed that although the teams with the errors did not perform as well as the teams without errors in all categories, the differences were not statistically significant. In Scenario 8, the teams without the errors performed statistically better in all categories. After the errors were introduced, the teams without errors left the lane less often, their maximum distance outside the XTE limit was less, and their time outside the XTE limit was less.

In general, the teams without the errors in their ECDIS performed better than those teams that had an error introduced into their ECDIS. However, the teams with errors were all able to identify the errors and correct for it before the ship was in danger. This suggests that the teams were practicing bridge team management principles and were able to identify the error and trap it early.

4. FINDINGS

Looking at all four studies together a pattern is evolving even though the sample sizes where different and there were differences in the backgrounds of those who participated. We also recognize the difficulties associated with self-reporting surveys and with using traditional course exams as a measure of the effectiveness of simulation. The findings of the studies, when considered together suggest that:

1. The participants in all studies embraced technology and felt strongly that the early introduction of ECDIS and radar in their education are very highly valued.
2. In nearly every case, on the post simulation questionnaire, when asked if ECDIS and radar helped participants in their navigation, the overwhelming response was positive. Although actual performance often did not improve significantly, the participants felt that their situational awareness was better.
3. Participants tended to use the advanced navigation methods differently, sometimes inappropriately. This suggests that the current methods of teaching those technologies, as required by STCW may be inappropriate.
4. With the diversity in response, the data suggests that it may not be appropriate to teach all subjects in the simulator.
5. There is evidence to suggest that by using observational learning techniques and bridge simulators in professional courses that traditionally have not used these methods there is an opportunity to take advantage of, and maximize, both explicit and implicit learning.

5. CONCLUSIONS

Firstly, although the results of this study can be generalized only for the cadets who volunteered to participate in the studies, the data suggest that maritime students understand the importance of formalized training in modern navigational technologies and overwhelmingly prefer new technology instruction to be accomplished through use of computer simulation. They also agreed that simulation training should be introduced much earlier into their program than has ever been attempted previously. This suggests that a new training paradigm is in order. Accordingly, this work has prodigious implications for faculty as well because a paradigm shift as we suggest may change their role from a transmitter of knowledge to a facilitator of learning [17].

Second, it is strongly recommended that equipment manufacturers work more closely with maritime educators as they continue to develop advanced navigation systems. Studies similar to the four described in this paper should be undertaken by equipment developers in collaboration with the faculty of maritime universities equipped with modern bridge simulation technology. Such studies, if conducted properly, could expose equipment deficiencies that may not be detected by traditional research and development methods using only a limited number of professional mariners for equipment evaluation. An added benefit to such collaboration between equipment manufacturers and maritime educators would be to introduce students much earlier to equipment and methods they are most likely to be using upon graduation. If the trend of increasing maritime accidents is to be reversed, maritime education must not continue to lag so far behind industry practices.

Finally, we believe it is vital that through carefully controlled and effective simulation training maritime students develop "bridge-mindedness" to a very high degree well before being turned loose to operate multimillion dollar vessels capable of causing catastrophic environmental disasters after simple navigational errors. Often equipment is added to vessels with little effort to train bridge officers in its use. When this happens, the equipment is frequently underutilized or ignored completely [15]. On many vessels the reduced workload that the technology enables has resulted in reduced manning and an increase in the number and scope of tasks for which a bridge watchstander is responsible [20]. Although technology has the potential to reduce maritime accidents, others have noted that technology alone does not prevent accidents and in some instances actually contributes to them. Human error, misinterpretation of data and poor decision making are still factors despite the presence of reliable technology [10]. Proper training in bridge watchstanding procedures is no longer optional because such errors simply will not be tolerated by the world community in the future.

ACKNOWLEDGMENTS

The authors would like to thank all of the students at CMA who participated so willing and shared their experiences with us and Captain James Hartney for his knowledgeable assistance and advice in the many simulation experiments that were part of these four studies.

References

[1] Bird, G., Osman, M., Saggerson, A. & Heyes, C. (2005). Sequence learning by action, observation and action observation. British Journal of Psychology, 96, pp. 371 – 388.

[2] Browne, S., & Buckley, J. (2009). ECDIS and error trapping: A bridge simulation experiment. Accepted for presentation at the Maritime Simulation Conference (MarSim 2009) in Panama, August.

[3] Buckley, J. & Pecota, S. (2008). Integration of ECDIS into bridge simulation courses: Are there performance or perception differences? Proceedings of the 15th International Navigation Simulation Lecturers' Conference. St. John's Newfoundland, Canada, July.

[4] Buckley, J. & Pecota, S. (2008). The introduction of new technology into bridge team management and bridge resource management: An ECDIS example. Seaway, August.

[5] Buckley, J., & Pecota, S. (2009a). Practice-based rules of the road instruction: exploiting new technologies. Proceedings of the Maritime Education Summit Conference. Massachusetts, March.

[6] Buckley, J., & Pecota, S. (2009b). Practice-based learning: Exploiting new technologies. In R. Dauer, R. Sagarra, & F. Martinex de Oses (Eds.), Maritime transport IV (pp. 457 – 471). Barcelona, Spain: Universitat Politecnic de Catalunya.

[7] Donderi, D., Mercer, R., Hong, M., & Skinner, D. (2004). Simulated navigation performance with marine Electronic Chart and Information Display Systems (ECDIS). Journal of Navigation, 57, pp. 189 – 202.

[8] Gonin, I., Dowd, M. & Alexander L. (1996). Electronic Chart Display and Information System (ECDIS) Test and Evaluation, Summary Report. Report No. CG-D-20-97. U.S. Coast Guard Research and Development Center, Groton, CT.

[9] Hertel, J. & Millis, B. (2002) Using Simulations to Promote Learning in Higher Education. Stylus Publishing: Sterling, VA.

[10] Hetherington, C., Flin, R. & Mearns, K. (2006). Safety in shipping: The human element. Journal of Safety Research, 37, pp. 401 – 411.

[11] Kopacz, Z., W. Morgas and J. Urbanski (2003). 'The Ship's Navigation Function, Ship's Navigation Processes, and Ship's Navigational Information.' The Journal of Navigation, 56, pp. 101 – 109.

[12] Lutzhoft, M.H. and S.W.A. Dekker (2002). "On Your Watch: Automation on the Bridge." The Journal of Navigation, 55, pp. 83 – 96.

[13] Maxwell, J., Masters, R., Kerr, E., & Weedon, E. (2001). The implicit benefit of learning without errors. The Quarterly Journal of Experimental Psychology, 54A(4), pp. 1049 – 1068.

[14] O'Hara, J., & Brown, W. (1985). An investigation of the relative safety of alternative navigation system designs for the New Sunshine Skyway Bridge: A CAORF simulation. CAORF Technical Report Number 26-8232-04. National Maritime Research Center, Kings Point, N.Y.

[15] Olsson, E., & Jansson, A. (2006). Work on the bridge – studies of officers on high-speed ferries. Behaviour & Information Technology, 25 (1), pp. 37 – 64.

[16] Portal, J., & Sampson, L. (2001). Improving high school students' mathematics achievement through the use of motivational strategies. Unpublished thesis, St. Xavier University, Chicago.

[17] Raelin, J. (2007). Toward an epistemology of practice. Academy of Management Learning & Education, 6(4), pp. 495 – 519.

[18] Rhind, D., & Head, T. (2004). The benefits of implicit learning when training Ab-Initio pilots. International Journal of Applied Aviation Studies, 4(2), pp. 153 – 170.

[19] Salevesen, B, & Soma, T. (2009). Behavior-oriented risk management. In R. Dauer, R. Sagarra, & F. Martinex de Oses (Eds.), Maritime Transport IV (pp. 369 – 377). Barcelona, Spain: Universitat Politecnic de Catalunya.

[20] Sauer, J., Wastell, D., Hockey, R., Crawshaw, C., Ishak, M. & Downing, J. (2002). Effects of display design on performance in a simulated ship navigation environment. Ergonomics, 45 (5), pp. 329 – 347.

[21] Smith, M. (1993). Precision electronic navigation in restricted waterways: a simulator investigation. United States Coast Guard Research and Development Center, Groton, CT.

[22] Smith, M., Akerstrom-Hoffman, R., Pizzariello, C. Siegel, S., Schreiber, T. & Gonin, I. (1995). Human factors evaluation of Electronic Chart Display and Information Systems (ECDIS). United States Coast Guard Research and Development Center, Groton, CT.

[23] Smith, M. & Mandler, M. (1992). Human factors evaluations of electronic navigation systems. Proceedings of the First Annual Conference and Exposition for Electronic Chart Display and Information Systems, Baltimore, MD. February 28 – 29.

[24] Swift, A. Bridge Team Management. Nautical Institute, London, 1993.

[25] Sun, R., Zhang, X., Slusarz, P., & Mathews, R. (2007). The interaction of implicit learning, explicit hypothesis testing learning and implicit-to0explicit knowledge extraction. Neural Networks, 20, pp. 34 – 47. Available online at www.sciencedirect.com.

[26] Taylor, R., & Chi, M. (2006). Simulation versus text: Acquisition of implicit and explicit information. Journal of Educational Computing Research, 35(3), pp. 289 – 313.

[27] Turner, J., Cox, K., CiCintio, M., Meyer, D., Logan, C., Thomas, C. (1998). Creating contexts for involvement in mathematics. Journal of Educational Psychology, 90, pp. 730 – 745.

[28] United States Coast Guard (2004). Fiscal year 2004 report. Retrieved February 15, 2005 from www.uscg.mil/news/reportsandbudget/2004_report.pdf.

[29] Willingham, D. & Goedert-Eschmann, K. (1999). The relation between implicit and explicit learning: Evidence for parallel development. Psychological Science, 10(6), pp. 531 – 534.

THE SHANGHAI MASS CONNECTION

Bani Ghosh,
Dr., PhD in Economics
Associate Professor and Department Chair
Department of International Maritime Business
Massachusetts Maritime Academy
101 Academy Drive, MA 02532, USA
Email: bghosh@maritime.edu

Abstract. There is a growing demand for trained maritime personnel both in the seafaring and shore-side sectors. Historically, we have seen a trend of sea-farers transitioning into shore-based opportunities. However as the jobs become more demanding with regard to proficiency in business and management strategies, information technology and security related issues, a new breed of maritime professionals is emerging in the global arena. Shore-based maritime professionals are required to master the intricacies of marine insurance, maritime finance, inter-modal logistics, chartering and brokerage, be proficient in the latest software tools and engage in safe and environmentally friendly practices in a multicultural and diverse environment. Although the seafaring side of the shipping industry embraces globalization, the shore side maritime professionals are generally recruited from the host nation with little cross pollination. While it is quite common to have a Filipino officer on a Greek owned ship registered in Liberia, chartered by a Chinese company carrying cargo from India to Japan, the shore based professionals running the Greek company will typically be Greek nationals. The paper calls for greater cooperation among maritime academies that bring new opportunities. Specific initiatives undertaken by Massachusetts Maritime Academy in this context are discussed in detail.

1. INTRODUCTION

A shore based maritime professional sounds like an oxymoron but dramatic technological and regulatory developments in the maritime sector have created a growing demand for adequately trained maritime personnel in the shore-side segment of the maritime sector. Historically, there has been a trend of sea-farers who transitioned into shore-based opportunities after spending some years at sea. However, in the past decade, the shore-side jobs have become more demanding and there is an emerging need for a new breed of professionals with specific skill sets. These individuals are required to master the intricacies of finance, logistics, chartering and brokerage, marine insurance, be proficient in the latest IT tools and promote safe and environmentally friendly work practices in a multicultural and diverse environment. In the various maritime academies, the traditional emphasis has been on the training, education and retention of the seagoing students in the marine transportation and marine engineering programs. It is relatively recently that traditional maritime schools are introducing programs like International Maritime Business that pay attention to the shore side human resource needs of the shipping industry.

Although the seafaring side of the shipping industry embraces globalization, the shore side maritime professionals are generally recruited from the host nation with little cross pollination. While it is quite common to have a Filipino officer on a Greek owned ship registered in Liberia, chartered by a Chinese company carrying cargo from India to Japan, the shore based professionals running the Greek company will typically be Greek nationals. Technological innovations have made the world a much smaller place and the maritime sector particularly, has always been at the forefront of multinational initiatives. It is important that students of a maritime academy, who face the world as a workplace upon graduation, have some exposure of globalization during their training and education. IAMU, with its wide array of member scattered around the world can be a key catalyst in initiating a cross-pollination of training among its member institutions both on the sea faring and shore based segments.

Moreover, the current economic downturn, drop in trade volumes and security threats at sea have further changed the environment of the maritime sector. There is an urgent need felt by all stakeholders to comprehend the altered scenario and its implications as we train and educate the maritime professionals of tomorrow. This requires a concerted, joint effort by maritime academies worldwide as the impacts reverberate at different intensities around the world. The paper outlines the current labor market trends and also discusses some specific initiatives undertaken by Massachusetts Maritime Academy to add value to the maritime workforce.

Section 2 discusses the prevailing conditions in the shipping markets ranging from economic volatility to regulatory pressures stemming from safety, security and environmental concerns in a global arena. The impact on the maritime labor market is then outlined.

Section 3 focuses on the role of shore-based programs like International Maritime Business at MMA in meeting the labor demands and identifies some specific initiatives undertaken by Massachusetts Maritime Academy.

Section 4 provides conclusions.

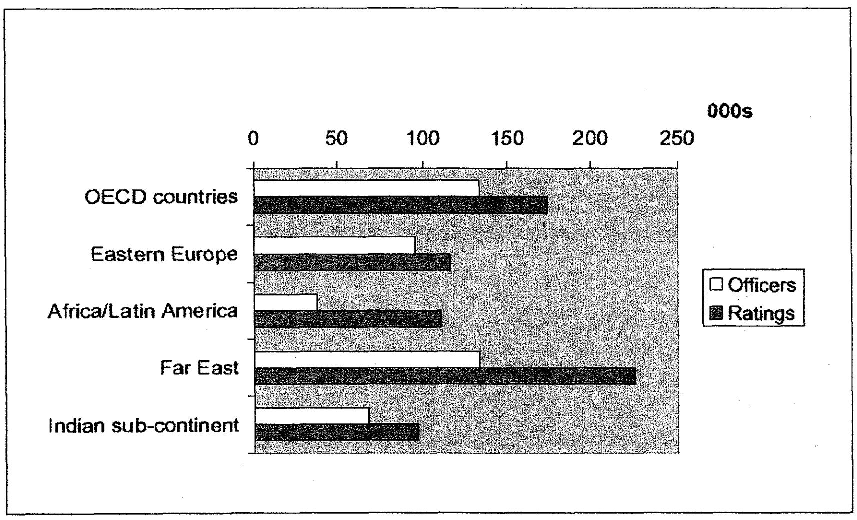
2. CURRENT CONDITIONS IN THE MARITIME LABOR MARKET: GLOBALIZATION AND THE MARITIME LABOR MARKET

The maritime sector is emblematic of the world economy, moving 90 % of the world's trade. Maritime transportation is one of the most globalized industries and its components such as vessels, personnel, flag registration, class inspections, insurance coverage etc. are purchased globally. Never has a clear understanding of the global economy and markets been more relevant to the shipping industry as it is now. While shipping has benefited more than almost any other sector in recent years from globalization, this has also made it more vulnerable to the global economic crisis. Freight and charter rates have plunged, jobs at shipping companies are being slashed and many ships are being parked for months at a time causing significant concern. Shipyards are facing cancellations and are caught in a financial turmoil. Bankers already badly wounded by excessive lending in real estate and involvement in toxic financial products are likely to suffer more through their shipping portfolios and are being extra cautious about lending. The higher cost of financing and insurance in a credit starved market is being experienced worldwide.

In spite of the global slowdown, it is expected that China will continue to be the main driver while S. Korea and Japan will take longer to restart on their growth paths. It is expected that China will recover faster from the recession than the US because of its sound financial and debt situation. However, even before the current recession, the dominating growth path of Asian economies in the maritime sector was clearly evident. The Asia-Pacific region is home to 11 of the world's top 20 container shipping operators, half of the world's 24 busiest container ports are in Asia, and more than one third of world trade either originates in or is destined for this region.

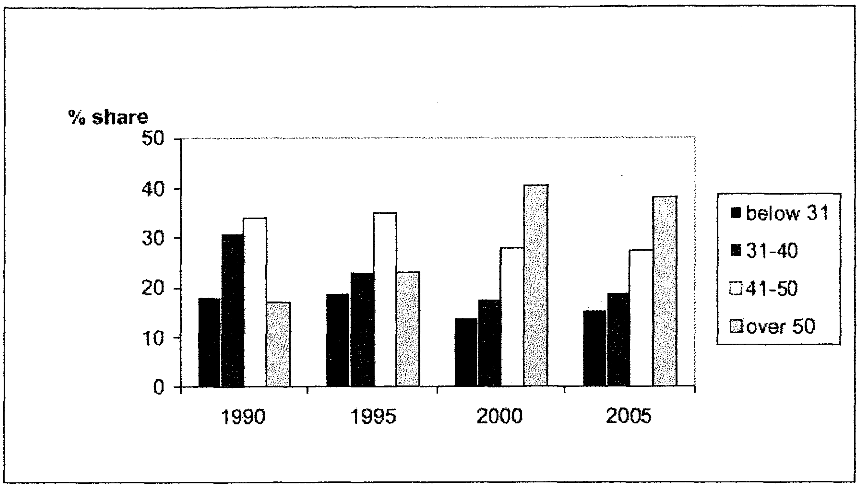
Asia accounts for 39 % of the global maritime market and is forecast to grow at a CAGR (Compound Annual Growth Rate) of 7 % between 2006 and 2010 according to the Hong Kong Shippers Council. Growth for port operations and services is expected to be widespread in the Asia Pacific region. The region accounts for 42 % of the global value market of port operations and is expected to grow its share to 44 % or US$54 billion by 2010 (CAGR of 6 %). The main areas of growth in ports and terminals are expected in China, India and Korea. By 2011, Asia is expected to handle 206 million TEUs, including 64 million TEUs in transshipment. As an example of this trend, it might be interesting to look at China's shopping spree of ports around the world in strategic locations that is aimed at gaining control of international shipping routes and at the same time, having direct access to raw materials. Various ports are now controlled by private Chinese enterprise. These include the Buenos Aires Container Terminal in Argentina, the Panama Ports Company, operator of the Cristobal and Balboa ports at each end of the Panama Canal; the Ensenada International Terminal at the international port of Manzanillo on Mexico's Pacific coast; a large operation in Veracruz, on Mexico's Atlantic coast and two ports in the Bahamas. This trend creates a need for maritime professionals to be conversant with topics like international business cycles, maritime finance, port terminal operations and management that requires specialized training.

The impact of globalization and the emergence of Asian economies in the maritime labor field have been significant. The complexity of seafaring labor supply revolves around a variety of factors like age, marital status, family and domestic commitments, safety and security of life at sea, tax laws and alternative employment opportunities. The seafaring laborer is a truly international entity represented by various nationalities, employed on board vessels under different flags, owned and operated by citizens of many different countries. Seafarers are considered to be unique migrants as they are able to participate in a nation's seafaring labor force without actually shifting residence. However, there are significant disparities in salary and tax benefits depending on the nationality of the individual. It is not uncommon to see an Indian seafaring officer in a Norwegian vessel enjoying significant salary and tax benefits which may not be available to someone from a different part of the world. The BIMCO/ISF Manpower Update of 2005 indicates that the worldwide supply of seafarers in 2005 is estimated to be 466,000 officers indicating a shortfall compared to the demand of 476,000 officers. There is excess supply in the market for ratings where there is a supply of 721,000 ratings while demand is for 586,000. The OECD countries (North America, Western Europe, Japan etc.) remain an important source of officers, although Eastern Europe has become increasingly significant. The Far East and South East Asia, particularly the Indian sub-continent continue to be the largest sources of supply of ratings and are rapidly becoming a key source of officers (Fig. S.1). The report indicates that China has seen a significant increase in maritime labor supply, although most of the additional workforce is currently used by the Chinese-owned fleet to meet expanding domestic requirements and some Chinese crew still experience English language difficulties. It indicates that the world fleet continues to rely heavily on officers from Europe, North America, Japan and other OECD countries. However, over 25 % of these are over 50 years old, and well over 50 % are over 40 (Fig. S.2). Most are in senior positions such as Masters or Chief Engineers and the impact of their retirement could be severe. The report emphasizes the need to progress Asian seafarers who represent a much younger demography (Fig. S.3) to senior positions where fewer than 8 % of officers from the Far East are over 50. Hence, we see that there are some areas of concern in the seagoing segment of the labor market.



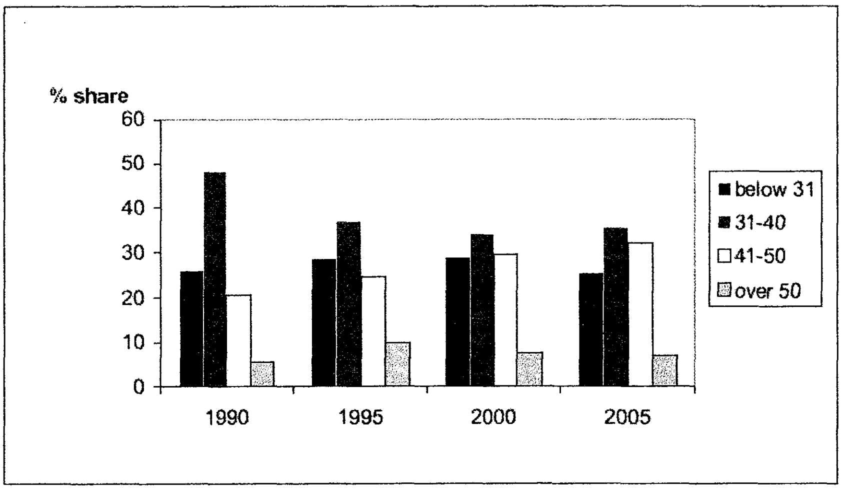
Source: BIMCO/ISF estimates.

Fig. S.1. Supply by Area of Domicile 2005 (catering and hotel staff excluded)



Source: BIMCO/ISF estimates from Company Surveys.

Fig. S.2. Age Structure for OECD Officers



Source: BIMCO/ISF estimates from Company Surveys.

Fig. S.3. Age Structure for Far East Officers

The report also points out that, new regulatory requirements, such as the ISPS Code, together with commercial demands, have increased the workload on board. This has resulted in significant stress and fatigue due to additional time demands for existing officers that need to be addressed.

In order to keep up with the changing times, the shore side maritime professional is now being recruited with a well defined skill set required to tackle the current challenges of the industry. Concerned about the effective implementation of various regulations imposed on the maritime sector, more and more ship owners are turning to professional ship managers for assistance. Putting ships out to third-party managers such as Acomarit, Wallem, V Ships, Denholm, Barber, Columbia and the Schulte Group not only enables owners to acquire compliance, but also gives them the benefits of economies of scale. Acomarit joined forces with World-Wide and Teekay Shipping to form Marine Contracting Association with 250-plus ships, while Wallem has turned to e-commerce for its marine supplies, using the internet to invite and receive bids from suppliers resulting in a 20 % saving.

As the regulatory framework of the shipping industry gets more complicated, this reliance on the professionally trained ship manager with a sophisticated quantitative and IT focus will continue to grow. The fragmented regulatory structure is discussed in greater detail in the next segment. Today, more than ever, we need a well rounded maritime professional who is conversant with all aspects of the shipping industry. This includes safety and environmental regulations, a clear understanding of finance, budgeting, shipping business and current software used in the industry for better management of vessels and compliance with regulatory bodies.

Fragmented regulatory environment

Significant complexity, created in part by differing interpretations and applications of new rules by flag and port states, invariably means extra costs to the maritime industry. Those who can minimize such costs through greater efficiency in operations stand to gain, and ship managers with such an advantage might find themselves benefit in the form of extra business from those who cannot effectively manage this trend.

When the ILO adopted the Maritime Labor Convention (MLC) on 23 February 2006, Director-General Juan Somavia called it a historic moment for the world's more than 1.2 million seafarers. Three years on, in line with the ILO's five-year Action Plan, this key global agreement has now been ratified by five major flag States and key ILO Members, representing nearly 45 per cent of the world's gross tonnage. Although the new ILO Convention emphasizes that "No longer will seafarers or ship owners face a bewildering array of national laws subject to differing international labor standards. Under its provisions, for the first time in history, there will be a truly global foundation available for the various national laws in the maritime labor sector," there continues to be room for confusion and bewilderment. MLC is designed to cover the minimum requirements for seafarers to work on a ship, conditions of employment, hours of work and rest, wages, leave, repatriation, accommodation, recreational facilities, food and catering, occupational safety and health protection, medical care, welfare and social security protection. In the action plan for 2006 – 2011, the specific strategic goals for 2009 and 2010 are as follows: 2009: development of the training materials for the flag State and port State control guidelines; at least 24 ratifications or coverage of at least 24 per cent of world gross tonnage.

2010: complete development of the ILO database to record country reports on flexibility determinations and to record problems and complaints arising in the context of port State inspections.

These objectives seem ambitious at best as we finish the first half of 2009 for the 1.2 million seafarers around the globe. According to ILO reports, the growing number of ship detentions in many ports worldwide had alarming consequences for the shipping industry. In the European Union alone, the number of detentions of ships for a wide range of issues including environmental, ship safety, security and labor standards, has risen for the second year in a row, from 944 in 2005 to 1,174 in 2006 and 1,250 in 2007. The criminalization of crew in many of these incidents has put an additional strain on the supply of maritime labor. The lack of harmony in port state control regulations is a cause of utmost concern. Additional security initiatives undertaken at national and regional levels are also adding to the complexity.

The US Department of Homeland Security (DHS) Strategic Plan for 2008 – 2013 outlines the following national maritime security goals. By FY 2013, 86 % of worldwide US destined containers will be processed through Container Security Initiative (CSI) ports. By FY 2013, 25 % reduction in the maritime terrorism risk over which US Coast Guard has influence. DHS calls for redoubling of efforts to develop technology that can detect radiation and work with the maritime transportation industry to deploy this technology to maximize security without causing economic disruption in its initiative to monitor our ports. However, the topic of maritime security goes beyond ensuring the the internal security of US ports and harbors and moves to the high seas where cargo and crew have become extremely vulnerable to piracy with no clear resolution in sight. The United Nations Convention on the Law of the Sea (UNCLOS) defines piracy as any illegal act of violence committed against a ship on the high seas. There has been an alarming increase in pirate attacks in recent times and in April 2009, the world media was focussed on the attack on the Maersk Alabama that has really hit very close to home.

According to the annual report of the International Maritime Bureau Piracy Reporting Center, there were a worldwide total of 293 incidents of piracy against ships in 2008, which is up more than 11 % from 2007 when 263 incidents were reported. In 2008 – 2009 (until March), there have been 154 attacks in the Gulf of Aden and East coast of Somalia and 46 ships have been hijacked. The largest vesselseized by pirates was the VLCC Sirius Star that was taken 450 miles off the coast of Somalia. Now, more than ever, shipping companies are finding the critical need to have a vessel security plan and risk assessment strategy, hire a ship security team, perform security drills and ensure counter piracy measures to keep their crew and cargo safe.

Apart from maritime security issues, several instruments to reduce CO_2 emissions from ships are under consideration at IMO. These include Energy Efficiency Design Index, Ship Efficiency Management Plan, and the Energy Efficiency Operational Index. While these are very noble initiatives, the maritime business community wants assurance that the strategy to reduce carbon emissions to air must deliver the environmental goals while maintaining the sustainability of shipping interests. There has been noticeable improvement in the number of oil spills falling from an average of 25.2 spills in 1970 – 79 to 3.4 spills in 2000 – 2008, but a lot of work still needs to be done. The current recession in the market is a concern as people are more prone to cutting corners during such difficult economic times and are more likely to cause accidents. Fragmented and incompatible regulations at national and regional levels continue to prevail. The need for a unified, comprehensible set of standards understood and implemented worldwide and the ability to abide by them via training and education is proving to be a serious challenge for the maritime community.

The previous paragraphs provide some indication of the various layers of new regulations dealing with maritime safety, security and environmental concerns have led to increasing responsibilities and burdensome paperwork and administrative functions of senior officers on board vessels. These have caused stress and fatigue, pushing these officers to transition into shore based opportunities at earlier phases of their careers. This is becoming a worldwide phenomenon. Recent data (2007) from AMOSUP (Associated Marine Officers' and Seamen's Union of the Philippines) indicate that 20 – 25 percent of maritime seagoing professionals filing for retirement claims are less than 50 years old. This early transition and retirement among seafarers from the Far East will certainly accentuate the shortfall in the supply of seafaring officers. This critical issue therefore requires careful consideration.

Role of the shore-side maritime professional

We now turn our attention to the shore side segment of maritime labor. In order to explain the role of the shore side segment, the example of maritime clusters can be used. Internationally, the maritime sector has a history of evolution in geographical clusters on the shore side. These clusters have an emphasis on cross-industry linkages and complementarities and have been known to foster synergies that have boosted the development of the maritime community and created significant number of jobs on the shore side of the maritime industry. The following countries/regions in the world are some examples of competitive maritime clusters:

- Houston, USA: global oil and gas center with substantial maritime interests;
- UK: large maritime cluster with specialization in advanced maritime services;
- Norway: complete globally oriented cluster with focus on knowledge development;
- Singapore: open easy-to-access port sector cluster serving as a gateway to Asia;
- South Korea: world leader in ship-building, stimulated by an active industrial policy.

As the abovementioned list shows, clusters can become engines of value creation and innovation. For example, the Norwegian cluster is responsible for providing 40 % of marine insurance coverage to the world's tonnage. The Norwegian government is heavily invested in providing adequate resources for innovation, education and research in order to become a leading maritime power in Europe. This has certainly had an impact on the Norwegian maritime industry and educational institutions where these shore based support services have gained prominence.

Learning from the success of maritime clusters, it makes complete sense to nurture such inter-connected synergy in the maritime education sphere. It is important that we recognize the various facets of shore based maritime labor that needs to cooperate with the seafaring side for the smooth functioning of the industry. Some of the key personnel on the shore side are maritime educators, business management professionals, brokers, freight forwarders, emergency management personnel, environmental protection personnel, surveyors, loss adjustors, ship builders and naval architects, parts and repairs providers, logistics providers in ports and inland transportation etc. This is by no means an exhaustive list but provides some understanding of the significant support system that needs to exist on the shore side for the safe and efficient operations of ships. The same notion was observed in a manpower study in Singapore that was jointly commissioned by the Maritime and Port Authority of Singapore (MPA) and the Ministry of Manpower (MOM)/Workforce Development Agency (WDA) in June 2003. The study showed that there were about 116,800 persons employed in the Singapore maritime industry. Of these, about 70 % were engaged in shore-based employment, while 30 % were sea-going personnel. The shipping management sector, ship chartering, ship agencies and ship-broking activities, was the largest employment sector, absorbing about 40 % of the maritime workforce (both shore-based and sea-going). The study projected that the maritime workforce will increase at an annual compound rate of up to 5,2 % for shore-based personnel and 1,9 % for sea-going personnel (onboard Singapore-registered vessels), reaching over 200,000 for the entire maritime industry in 2018. The sectors with the highest employment growth are shipbuilding and repair, freight forwarding, shipping management and cargo terminals.

Although these trends are quite significant, very often, when we have a discussion on maritime training and education, we focus only on the seafaring side. Our attention is also typically restricted to national boundaries and cross border training is neglected. Although shipping is a truly global business, much of the training takes place within national boundaries in a mono-cultural environment. The following initiatives undertaken by Massachusetts Maritime Academy focus on meeting the education needs of the shore based maritime professional in a truly international context.

3. MASSACHUSETTS MARITIME ACADEMY INITIATIVES

The newer majors

The existence of Massachusetts Maritime Academy as an educational institution began with an act of the State legislature, June 11, 1891, which created the Massachusetts Nautical Training School. The school has grown significantly from an entering class of forty cadets in April, 1893, to the largest State maritime academy in the US. In addition to the traditional sea going programs like Marine Transportation and Marine Engineering, since 1990, the Academy's programs have been expanded to include Facilities Engineering, Marine Safety and Environmental Protection, International Maritime Business and Emergency Management.

The International maritime Business major prepares graduates to enter the maritime shipping and transportation industry as a business professional. As shown in Fig S.4, the curriculum includes introductory courses in vessel familiarization, cognate courses in admiralty law and port terminal operations; and major specific courses in economics, finance, accounting, business of shipping, global logistics, chartering and brokerage, marine insurance, e-commerce, international business, negotiations and organization management. It also includes a capstone seminar in international maritime business during the senior year. There is significant emphasis on the use of quantitative tools and information technology, particularly proficiency in spreadsheet skills and understanding of latest software used in the maritime sector in our courses. The practical component of the curriculum includes one freshman sea term and two internships. We have aggressively pursued international internships and were successful in placing interns in places like Tokyo, London, Antwerp and Guayaquil.

B.S. International Maritime Business

Semester 1

HU-1111	*English Composition*	3	0	3
SM-1111	*Algebra and Trigonometry*	3	0	3
SM-1131	*Chemistry I*	2.5	1	3
SM-1141	*Computer Applications*	0	2	1
MT-1111	*Vessel Fam and BST*	3	2	4
EN-1111	*Intro Steam Engineering*	2	1	2.5
	Total Credits			16.5
ST-[illegible]	*Sea Term I*			6

Semester 2

HU-1222	*Analysis of Literature*	3	0	3
SM-1212	*Calculus I or*			
SM-1214	*Applied Calculus*	3	0	3
GESM-5	*Science/Math Group II*	3	1	3.5
SS-1211	*Western Civilization*	3	0	3
IM-1212	*Macroeconomics for Bus.*	3	0	3
	Total Credits			15.5

Semester 3

SM-2117	*Quantitative Methods*	3	0	3
IM-2121	*Accounting I*	3	0	3
GESM-6	*Science/Math Group III*			3/3.5
SS-2131	*Economics II Micro.*	3	0	3
HU-2141	*Spanish I*	3	0	3
	Total Credits			15/15.5

Semester 4

IM-2221	*Accounting II*	3	0	3
IM-3133	*Finanace I*	3	0	3
HU-2242	*Spanish II*	3	0	3
SM-2218	*Statistics*	3	0	3
SS-2232	*World Econ Geography*	3	0	3
IM-2211	*Business of Shipping*	3	0	3
	Total Credits			18

Semester 5

SS-2121	*American Government*	3	0	3
GEHU-3	*Humanities Group I*	3	0	3
IM-3233	*Finance II*	3	0	3
IM-3111	*Transportation Op Mgmt*	3	0	3
SS-3121	*Admiralty Law*	2	0	2
GESS-5	*Social Science Group III*	3	0	3
	Total Credits			17
IM-3011	*IMBL Cooperative I*			6

Semester 6

MT-3252	*Port Terminal Op Mgt*	3	0	3
IM-3231	*Vessel Chartering*	3	0	3
HU-8072	*Business Communications*	3	0	3
SS-3221	*Business Law*	3	0	3
IM-1211	*Organizational Mgmt*	3	0	3
	Total Credits			15

Semester 7

IM-3241	*Principles of Marketing*	3	0	3
IM-4111	*Marine Insurance*	3	0	3
IM-4112	*International Business*	3	0	3
IM-4151	*Global Bus Logistics*	3	0	3
	Free Elective 1	3	0	3
	Total Credits			15
ST-2321	*Sea Term Ind. Study or*			6
IM-4011	*IMBL Cooperative II*			6

Semester 8

IM-4211	*Seminar: Negotiation*	3	0	3
IM-4251	*Comp App in E-Com*	3	0	3
IM-4212	*Seminar: Int Mar Bus*	3	0	3
GEHU-4	*Humanities Group I or II*	3	0	3
	Free Elective 2	3	0	3
	Total Credits			15

Fig. S.4. Curriculum of International Maritime Business

Our common freshman sea term gives students the opportunity to cycle through the offerings of various departments so that they get the whole picture of the maritime industry. During sea term, each student takes classes in Marine Transportation, Marine Engineering, International Maritime Business, Marine Safety and Environmental Protection and Emergency Management. They also stand deck and engine watch and engage in shipboard maintenance. This training is critical for building the foundation for a well rounded maritime professional conversant with the various facets of the maritime industry and the end product is appreciated by the organizations that hire our graduates. The school also offers a minor (a six course selection) in International Maritime Business that is very popular among students pursuing sea going career paths.

It was not easy to break from tradition and popularize these newer shore based programs at a traditional maritime academy like ours. Even today, when a typical student applies for admission to a maritime academy, the typical choices are marine transportation or marine engineering. This mind set was quite evident when we conducted a survey on students in the International Maritime Business program in April 2009. When asked the question, when a typical student decides to pursue the International Maritime Business program, most students responded that they chose the program either at the end of the first semester, or the end of first sea term or even at the end of the first year of college. It was quite startling to find out that only one student in the senior class selected this program at the beginning of freshman year. This trend is slowly changing over the years as the program is gaining popularity. This is evidenced in the following line graphs in Fig S.5.

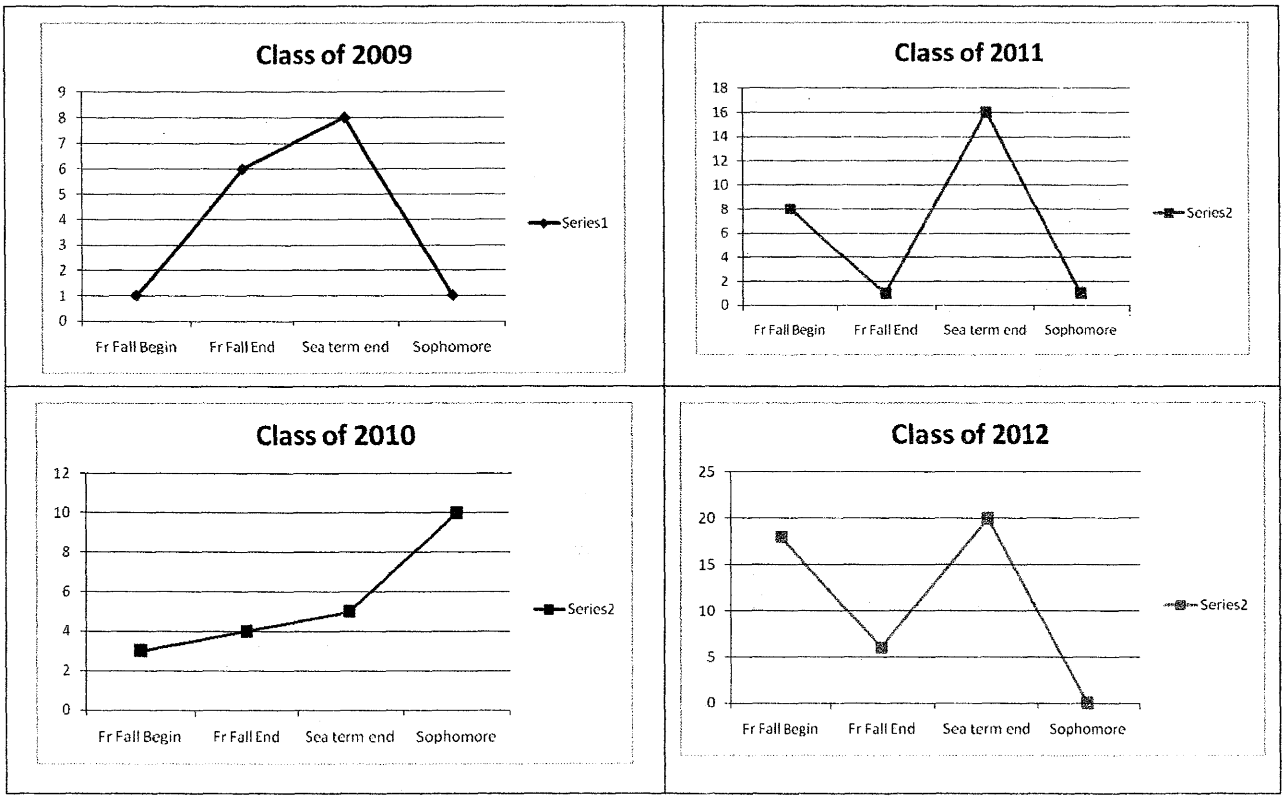


Fig. S.5. Student Decision to choose International Maritime Business at MMA

As discussed in previous sections, today, more than ever, we need a well rounded maritime professional who is conversant with all aspects of the shipping industry. This includes safety and environmental regulations, an understanding of finance, budgeting, shipping business and current software used in the industry for better management of vessels and compliance with regulatory bodies. The fragmented regulations and compliance related issues, pressures of heightened cost competitiveness in a recessive market and the information technology demands of the current maritime industry is proving to be too overwhelming for deck officers and engineers who need time to concentrate on the operational aspects of their departments. We have received feedback from shipping companies who are considering the idea of creating a new seafaring regulatory compliance officer position. The education and training received in our shore based programs like International Maritime Business is proving to be a good fit for such positions, thereby adding to their popularity.

Participation in International Conferences and internships:

Top students in the International Maritime Business program have had the opportunity to travel to Australia, China, Ukraine and California to make presentations at the Annual General Assembly of the International Association of Maritime Universities (IAMU). This provides an international arena for students to exchange ideas, discuss current issues affecting the maritime industry and make presentations on chosen research topics. The lessons learned in the process are invaluable.

Each student in the major must complete two internships, each worth 6 credits. Performance is monitored by the host organization whose representative sends a written evaluation of the student. As mentioned before, in keeping with the global trends we have been successful in securing international internships for our students in Tokyo, Belgium, UK and Ecuador for a complete cultural immersion for six weeks. The mandatory sea term allows the entire student body to travel to various new destinations and get hands on training on board a working ship and happens to be a critical component of our curriculum.

Student Exchange Program with Shanghai Maritime University:

Ten students from Shanghai Maritime University, a school of approximately 18,000 undergraduates, arrived at Massachusetts Maritime Academy on February 25, 2009 as the first contingent in a pilot program between the two schools. These students were either pursuing a sea going career in Marine Transportation or a shore based career in International Maritime Business. The Chinese students are currently living in the dorms with ten MMA sophomores in the International maritime Business and Marine Transportation programs. They are thriving in their new environment, soaking in everything that their hosts have to offer (Fig S.6). Besides being engaged in Academics, they were taken on a tour to

Fig. S.6. The Shanghai Mass Connection

Washington DC and various tourist spots in Massachusetts. Their extra curricular activities included attending popular baseball games, ferry rides to Martha's Vineyard, trekking in Maine, a visit to the State House in Massachusetts, a day at the Oceanographic Institute in Woods Hole and many such fun activities. Their American counterparts will visit Shanghai Maritime Academy during the spring semester of 2010 in a reciprocal arrangement. They are very eager to visit China and spend a semester in Shanghai, tour the Great Wall of China that they have only seen in pictures. Besides their core curriculum, they will also take a course in Chinese history and culture. This is an extremely crucial immersion program initiated by MMA accentuated by the increasing significance of China in the maritime sector. The lessons learned in the process will foster greater cooperation and opportunities for students in the two institutions and the two nations for years to come. Such cross-cultural and cross-border education and training among Maritime Academies around the world is expected to go a long way in building a truly global maritime workforce. This is one area where an apex body like IAMU can be an excellent catalyst for development.

Seeking corporate partners to invest in education and technology

Massachusetts Maritime Academy has reached out to the corporate world in strengthening the quality of training and education and has been quite successful in these initiatives. One such example will be the MMA-SpecTec partnership. The SpecTec Group is a company specializing in the offering of software and services in the field of asset management with a significant market share in the maritime field. In December 2008, Massachusetts Maritime Academy, and SpecTec entered a cooperation agreement in which SpecTec agreed to donate AMOS (Asset Management Operating System) licenses to MMA for education and training purposes. This was the first license donation partnership that SpecTec had entered with a Maritime Academy in the US. Previous partners included Dalian Maritime University, National Taiwan Ocean University and Italian Maritime Academy. The use of AMOS will help the students to understand better all the business and management aspects of shipping, machinery, nautical equipment, vessel and fleet maintenance strategy, update surveys and certificates as well as be compliant with the various rules and regulations in shipping. The software is currently used by various shipping companies across the globe and this partnership will help MMA in producing maritime professionals who are better equipped to meet the required skill sets in the current job market.

Fig. S.7. The SpecTec MMA Partnership

4. CONCLUSION

There is a significant growth in opportunities for the shore side segment of the maritime sector which needs to be efficiently managed in a very competitive global market. The need for high quality professionals to handle the business management, regulatory, security and environmental aspects of maritime transportation requires interdisciplinary training and education. Technological advancement has made its presence felt in every aspect of the shipping industry. However, technology needs to be managed effectively and efficiently in full compliance with relevant regulations in a multi cultural environment. The skill sets of maritime professionals need to be much more diverse and internationally sensitive to succeed in the present environment. Each era of change brings new opportunities and new challenges. The discerning and successful maritime professional must stay ahead of the learning curve and be prepared to adapt quickly. The initiatives undertaken by Massachusetts Maritime Academy are indeed steps in the right direction but the Shanghai Mass connection is just the beginning.

References

[1] Alderton, T. (2004), The Global seafarer: Living and working conditions in a globalized industry, International Labour Organization.

[2] BIIMCO/IISF Manpower 2005 update: The worldwide demand for and supply of seafarers, April 9, 2009, http://www.marisec.org/resources/Manpower2005UpdateSUMMARY.pdf.

[3] Commonwealth of Massachusetts, Massachusetts Maritime Academy, April 8, 2009, http://www.maritime.edu/.

[4] Hong Kong Shippers Council, Shippers today, April 10, 2009, http://info.hktdc.com/shippers/vol31_2/vol31_2_Ocean06.htm.

[5] Horck, J. (2004), An analysis of decision-making processes in multicultural maritime scenarios. *Maritime Policy and Management*, 31(1), pp.15 – 29.

[6] International Labour Organization, Achieving the seafarers' international bill of rights: more than half way there! April 9, 2009. http://www.ilo.org/global/About_the_ILO/Media_and_public_information/Feature_stories/lang--en/WCMS_103260/index.htm.

[7] Leggate, H., and J. McConville (2002), The economics of the seafaring labour market, in: C. T. Grammenos (eds) (2002), *The Handbook of Maritime Economics and Business*, LLP: London Hong Kong, pp. 443 – 468.

[8] Marine Log (2004) April 8, 2009, http://www.marinelog.com/DOCS/NEWSMMIV/MMIVmar11a.html. Maritime Labour Convention, 2006: Action Plan 2006–2011, International Labour Organization, 10 April, 2009. http://www.ilo.org/wcmsp5/groups/public/---ed_norm/---normes/documents/publication/wcms_088034.pdf.

[9] Papademetriou G., Progoulaki M., and I. Theotokas (2005), Manning strategies in Greek-owned shipping and the role of outsourcing, Proceedings of 12th International Association of Maritime Economists Conference, Limassol, Cyprus, June, pp. 23 – 25.

[10] Ruhullah, A. (2003), The supply chain management of maritime labour and the role of manning agents: Implications and research directions, Proceedings of 4th IAMU General Assembly, Alexandria, Egypt.

[11] Somavia Juan (2006), A new "bill of rights" for the maritime sector: A model for fair Globalization, International Labour Organization, 10 April, 2009. http://www.ilo.org/public/english/bureau/dgo//speeches/somavia/2006/maritime.pdf.

[12] United States, Department of Homeland Security, One Team, One Mission, Securing Our Homeland: U.S. Department of Homeland Security Strategic Plan Fiscal Years 2008 – 2013 10 April, 2009, http://www.dhs.gov/xlibrary/assets/DHS_StratPlan_FINAL_spread.pdf.

[13] United States, The White House, Homeland Security, 10 April, 2009, http://www.whitehouse.gov/agenda/homeland_security/.

[14] Wu, B. (2004), Participation in the global labour market: experience and responses of Chinese seafarers, *Maritime Policy and Management*, 31(1), pp. 69 – 82.

TRAINING THE TRAINER FOR CADETS' TRAINING ON BOARD SHIPS

E. Barsan,
PhD, Professor
C. Muntean,
Assistant Prof.
Constantza Maritime University
E-mail: ebirsan@internav.com

Abstract. The real on board life demonstrate that practical training of future maritime officers is a very important link for creating their skills and competencies and for building up their professional culture. Unfortunately, not all shipping companies are paying the necessary efforts to ensure a real training environment on board their ships. Actually the implication of the shipping companies into the on board training process must have two stages: one is onshore, with the involvement of the training manager and the second one, the most important, is on board, where the master and the designated training officer must know what and how to do for tutoring the training process of cadets. The Navigation Department of our university started a project (MARCON) that has, among other objectives, the scope to train the tutors that are directly involved in the on board training of our cadets. We will start with the training of the shore based personnel from the Training department of crewing companies. For the officers that will conduct on board ships the training, monitoring and evaluation of the cadets, we will prepare guidelines and procedures, in order to have an uniform appreciation of the work of our cadets on board different ships.

1. INTRODUCTION

When we are talking about the simulators that we are using for the training of maritime students we mention about the virtual equipment that is simulated or about the virtual interface that allows the steering of the ship or the operations of the equipments.

The progress made in the last decade on terms of new built ships, and the integrated navigation equipment mounted on these ship's bridges, revealed that the term "virtual" used for what simulators can do is not really a good one. In the real life of maritime industry, most of the modern equipments are operated only by keyboard and mouse.

In the last few years, the assault of electronics on the ships' bridge has become more intensely than ever (Raicu G., et all, [8]). Although the maritime industry has always been a place where traditions and customs are highly valued and upheld, we are witnessing extraordinary changes taking place regarding the ships and their crew's, and the maritime industry as a whole.

In this regard, we must understand that today's maritime officers no longer use a sextant to shoot at stars or at the sun, if not for share curiosity, in order to determine a fix. They are instead required to be able to tell the difference between any type of alarms coming from any on board equipment, and to react properly to it Further more they are required to be able to quickly adapt to any new equipment and information displays, and to use it efficiently If we add the loading computers and the digital displays with engine or ships manoeuvring parameters, communication consoles, than we have a better picture of the new look of a modern ship (Hu J.S. et all, [4]).

All this can provide and intimidating prospect for the persons who are more accustomed to a more hands on approach to navigation, or those that are more reluctant towards technology, and do not put too much trust on sensors but are non the less experienced officers.

2. THEORETICAL ACADEMIC BACKGROUND AS FUNDAMENT FOR THE PRACTICAL TRAINING

These changes have occurred gradually, both on the ship's bridge and in her engine compartment, and are not to be found just at container ships, or tankers, but on all ships built in the last decade. So it has become obvious that a new breed of maritime officer is needed, one that is at home between computers and computer alarms, and is able to understand and use all the information presented to him from a multitude of displays and information systems.

And so we turn our attention to the next generation of maritime officers and we ask ourselves this question: How to better prepare them for their future career?

We at Constanta Maritime University (CMU) believe that a sound theoretical knowledge, combined with rigorous simulator and onboard training experience are very important factors in education as maritime officers. According to the 724/2004/EC directive of EMSA an important characteristics of a future maritime officer is the knowledge and skill with which he operates modern electronically equipment. This level of proficiency can be achieved by our students during their training with the complex simulators. As a young generation they are already very much accustomed to using computers in almost any aspect of their life, from communication to entertainment. All that they need is to embrace the old and tried and tested traditions of the seafarers, and therefore create bondage between the new and the old.

At CMU, in their last two years of study our students are already spending more and more time using specialized training simulators. If we compare their curricula to that of the students that have graduated only 5 years ago, we will find that their simulator training time has almost quadrupled. These training sessions under the supervision of instructors will help them gain the necessary information, and will allow them to quickly adapt to the ship's equipment particularities (Bârsan E. & Muntean C., [1]). However we are very much aware that the theoretical knowledge and practical skills acquired by the students while in school must be complemented by a training period on board ships.

Until four three ago, the academic training was spread over a five year period (see Table 1). On that curriculum, we had enough time to cover all the theoretical knowledge needed for all levels of maritime officers, from OOW (deck or engine) to Master or Chief Engineer).

Starting with the academic year 2005, in Romania the academic system was harmonized with the EU. Consequently, for the engineering academic studies, the study period was reduced from 5 to 4 years.

Table 1

Structure for the five year study period

1st year of study	Basic technical engineering studies	2 semesters
2nd year of study	Specific engineering studies + basic maritime studies	2 semesters
3rd year of study	Maritime theoretical studies	2 semesters
4th year of study	Advanced Maritime theoretical studies	2 semesters
5th year of study	On board training	2 semesters

Constantza Maritime University had to adapt to these new requirements and to reorganise the training curricula on a 4 years of study bases (as shown in Table 2).

Table 2

Structure for the four year study period

1st year of study	Basic technical engineering studies	2 semesters
2nd year of study	Specific engineering studies + basic maritime studies	2 semesters
3rd year of study	Maritime theoretical studies	2 semesters
4th year of study	On board training	1st semester
5th year of study	Advanced Maritime theoretical studies	2nd semester

As we can see from Table 2, the period allotted to the on board training was reduced from 12 month to a 6 month period. There were two immediate consequences:

1) we could not anymore cover all the theoretical maritime knowledge for operational and managerial level;
2) deck maritime students could not fulfil their compulsory 12 month on board training period until the graduation.

For resolving the theoretical knowledge coverage problem, we start a professional Master Course, were we shifted most of the disciplines related to maritime knowledge at managerial level, in accordance with the STCW (Loginovsky V., [7]).

The problem that could not be solved as before is related to the number of month of on board training that can be accumulated by the deck students until their graduation. In the actual 4 years of study curriculum, they have to finish their compulsory on board training stage after they graduate the University. This is one of the reasons for which the CMU Navigation Department initiate the MARCON project: to optimize the first training on board stage and to give some "instruments" for helping deck cadets to finalise their training period after graduation of CMU.

3. MARCON APPROACH FOR ON BOARD TRAINING

3.1. Present situation

The world wide concept for cadets on board training implies that this training has to be done only on board merchant vessels. In other words, most of the maritime Authorities are not more considering any other type of practical training (ship handling simulators, engine room simulators, training ships, etc.)

Of course that here it can be some debates, mainly regarding the utility of training ships (Laczynski B., [6]). US maritime academies are still making summer training voyages with big ex-navy ships, that can accommodate hundreds of cadets. Voyages are 2 – 3 month long and are very good for navigation training and engine room procedures. But on these ships there are nothing related with cargo work, multicultural human interaction and real merchant crew team work.

Constantza Maritime University had until 2003 a merchant training ship that could carry general goods (4500 dwt) and accommodate up to 110 cadets. Even caring real cargo on a 100 % commercial base, the running costs of the ship were to high to be supported by a public institution. More than that, the Romanian Naval Authority, refused from 2002 to recognise the time spent by cadets on board the training ship as valid on board training as required by STCW 95 (Smith-Robson C., [9]). In 2003 when the ship became 25 years old, he had to sale her for scrap.

Any how, taking into account the dynamics of recruitment at CMU (see Table 3), a training ship could not more cover the on board training requirements for a such large number of students.

Table 3

Dynamics of recruitment at Constantza Maritime University

Specialization	**Navigation and Maritime Transport**		**Marine Engineering**		**Electrical Engineering**	
Year	Full time	Reduced frequency	Full time	Reduced frequency	Full time	Reduced frequency
2000	105	-	50	-	14	-
2001	110	-	43	-	22	-
2002	80	-	70	-	65	-
2003	74	-	72	-	39	-
2004	165	120	67	45	40	7
2005	297	324	121	147	60	22
2006	396	327	113	147	53	40
2007	399	324	75	151	47	60
2008	426	418	101	205	77	103

Since than we had to rely only on the cooperation with shipping companies and crew agencies for ensuring to our students as many as possible embarkation opportunities as cadets.

However, we have to underline the NYK Line shipping company initiative to built two container vessels with special training facilities for 15 – 20 cadets, plus instructors (Bârsan E., [2]). In the NYK Line practical training philosophy, the role of a dedicated instructor is very important. After years of experience in running their own on board training programme, for their recruited cadets, they feel the necessity to update the training vessel concept, on a top new commercial vessel and with a limited number of cadets.

These new ships left the shipyards in May/September 2008, but the starting of the collective on board training programme was postponed due to two main factors:

- in the first place was world the economical crisis, and NYK Line took measures to reduce part of the costs (Kadir C. & Er I.D., [5]);
- the second factor was the request made by the new ships' crew, to have more time to become familiar with the ships, before having onboard supplementary persons.

About the common on board training our students are having on board ships we have observed the following:

- There are great differences between the quality and complexity of the on board training programs performed on board different ships.
- The number of shipping companies that have a modern and systematic on board training system is still very low.
- In some cases the STO (Ship Training Officer) responsible for their on board training program, was not aware of the cadet's the theoretical knowledge, his training, and his level of skill with different electronically equipment.
- There are still cases where there are no cadet training programs, and our students were required to just look and try to copy the actions of the officer delegated to work with them. During their on board training period, cadets are not usually guided and monitored by a dedicated STO (Ship Training Officer). They receive guidance from any of the watch officers, including Chief Officer/First Engineer, and any available officer was allowed to undertake assessment and to sign and declare the cadet as proficient in the tasks mentioned in the training record book.
- Out of the students who were not very satisfied about their on board experience many will not embrace a sea carrier and would prefer from the start to find o job ashore instead.

3.2. Helping the on board training tutors

As a result of these findings, Constanta Maritime University proposes a new program called MARCOM that aims at improving the on board training system, where here is one, and provide guide lines for where there is not. Its objectives are to improvement quality for the on board training of our students and to try to standardize this type of training no matter the shipping companies where our cadets are undertaking their on board stages.

One of main target group for this program is the instructors meaning the Company Training Officer (CTO) and the Ship Training Officer (STO). They are the persons who have the most important influence on the on board training experience of a cadet. They will be provided with a training handbook detailing the theoretical knowledge of the cadet, his training, and his level of skill with different electronically equipment (such as Radar, ECDIS, and GPS). Also this handbook will provide them with a step by step on board training program for the cadet, with detail information of each stage, a monitoring system, and a system of evaluation of the cadet's progress (Zhukov D. & Miyusov M.V., [10]). This way every member of the instructors group will know precisely what he or she needs to do, and won't have to improvise a program of his\her own. We believe that if those stages are followed there will be no more differences between the quality and complexity of the on board training programs performed on board different ships.

We would like emphasize that this program is not limited to our students. All the materials, the curricula, the training record book, the training handbook for the Company Training Officer (CTO) and for the Ship Training Officer (STO), all the documents and manuals used for individual and group training during sea time, will be prepared in English. A standardized format will be used, in order to facilitate their use by any student of any other maritime university.

3.3. Customised training materials for cadets

The other main target group of the program is of course the students. The Navigation Department of CMU is adapting the on board training curricula for deck students and engineer students to the new technological requirements existing on board modern ships.

The on board training should be correlated with the educational program in the university and the theoretical level of knowledge of the cadets.

More than that, we are aware that on board ships, the cadets are not always permitted to make (by their own) full use of the navigation equipment existing on bridge. This is why we undergo an intense navigation/engine simulator training program in the 3rd year of the curricula. During these simulator training sessions the students are encouraged to make use of different electronically equipment, as well of different types of equipment, in order to familiarize themselves with the integrated systems that they will find on board modern ships.

All this training is as realistic as possible, in order for them to be better prepared for their on board training experience, which is also what the shipping companies have required. This is why in the recent years our university has invested a lot in purchasing state of the art simulators for liquid cargo operations, radar navigation and the use of ARPA, and electronically navigation.

Another topic that needs to be discussed about the cadets is their training record book. According to the STCW Convention, their on board training period must be documented in a Training Record Book (TRB). This is indeed a very important document. If the on board training system for cadets is lacking, or even worse is non existent, this is the only document that provides a clue to the responsible officer about what needs to be done.

However the Training Record Book provided by the Romanian Naval Authority does not satisfy the requirements of this project. Its content though in many useful does not present the tasks the logical and order established by STCW and the guidelines established by IMO and it is not up to date.

For the purposes of this program we are considering to develop a new training record book, one that not only prioritizes training stages, but also presents them in a logical chronological order, with detailed instructions. In doing so, we are studying standard TRB model published by ICS/ISF or other record books issued in accordance with the provisions of other national maritime authorities.

4. TRAIN THE TUTOR THAT HAS ON BOARD TRAINING RESPONSIBILITIES

Finally, we would like to discuss about the training courses that we are developing for the shipping companies training officers (STO) and company training officers (CTO), in order to give them a better perspective on the great importance of a professional MET process applied on board their ships.

As top management of NYK Lines already noticed, the role of the designated on board training officer (STO) is crucial. Even with a very good dedicated on board training program curricula and well established assessment of cadet progress and feedback links, the quality of the training is based and depends on the professionalism and teaching capabilities of the STO.

This aspect of pedagogic skills of the STO was generally neglected by most of the shipping companies (Doyle E., [3]). The feedback that we have from our students when are coming back from the on board training stages, reveals that the activity of the STO is almost the most important think in achieving the goals of cadets' on board training.

In our feedback questionnaire, the students must answer at two consecutive questions, directly related with their opinion on the activity of the STO and the quality of the on board training. These questions are:

- How would you appreciate the activity of the STO?
- Please give a score for the quality of the on board training period.

The answers for these two questions for the 2008 series of cadets are shown in Fig. 1 and 2.

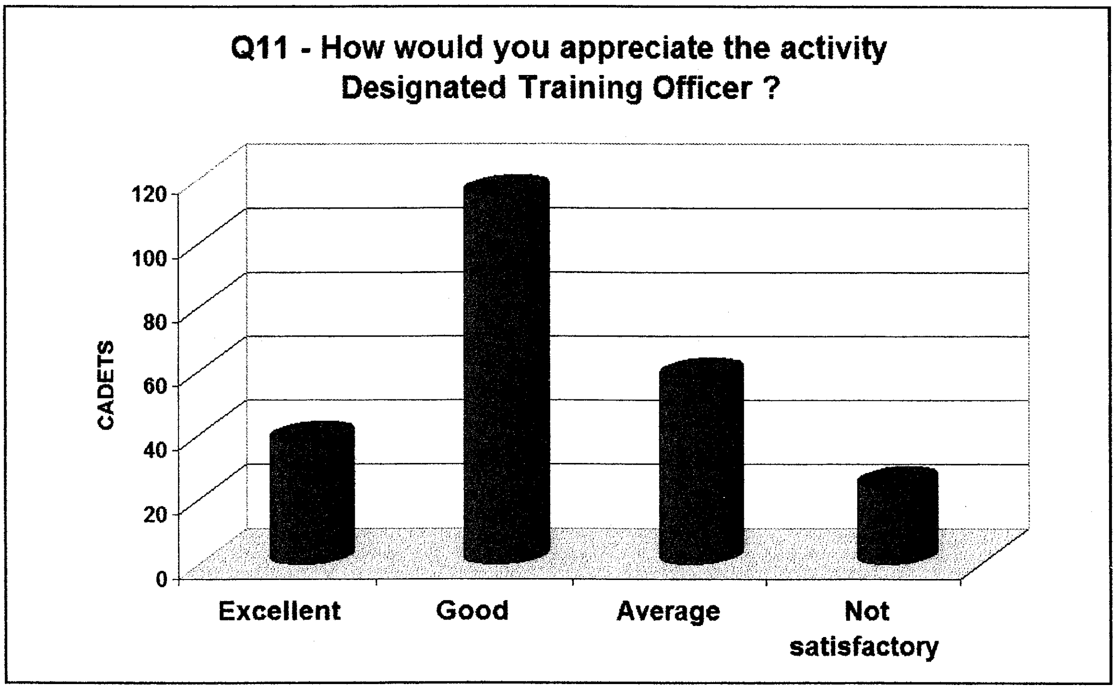


Fig. 1. Answers to the question "How would you appreciate the activity of the STO?"

If we compare the number of answers on different grades, we can see a direct similitude between the activity of the STO and the quality of training, at least from the point of view of the cadets.

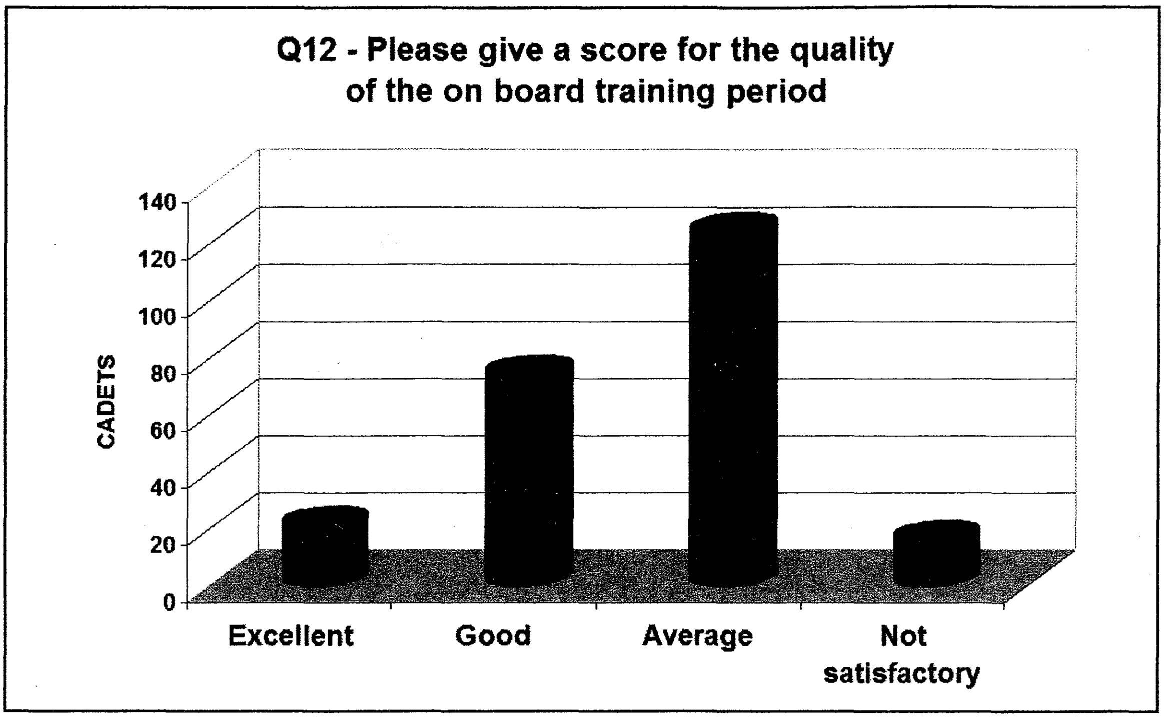


Fig. 2. Answers to the question: "Give a score for the quality of the on board training period"

Starting from these feedbacks, the Nautical Department of CMU considered, as part of the MARCON project, the necessity of making a special training course for CTOs and STOs, having as main teaching objectives the best practice and educational techniques that can be applied on board ships for tutoring, monitoring and assessing the cadets' activity. The course topics will be in conjunction with the new proposed Record Training Book that can be used for any cadet, no matter the maritime training institution.

The main problem that must be solved in order to increase the quality of the on board training process and to optimise cadets' achievements is a better correlation between the theoretical knowledge of the student and the participation to practical activities existing on board ships. The time spent on practicing one activity must also be defined, as well as the assessments standards for the most important tasks from the on board training curricula.

It is obvios that only a limited number of CTOs and STOs can directly participate to this course, so we intend to make the course materials suitable also for a self learning process.

In the first place, we will validate the course content ant teaching materials by running the course with the CTOs of the shipping companies and crewing agencies located in Constantza. Because the MARCON project is supported from EU funds, we will be able to invite to participate to this course also CTOs from the head offices of the shipping companies that had agreements signed with CMU for the training of our students.

With the help of CTOs we will be able to spread the course material on board ships, in order to be read and assumed by the STOs. In order to gain the CTOs help, we have in the first place to convince them about the benefits of the programme not only for the cadets, but mainly for the shipping companies that can have better trained officers.

Because the STOs are doing their tutoring activities without any money benefits, these teaching tasks must be imposed by the company, actually by the CTO. The number of STOs is very big, so we will be enable to undertake courses with them, so the on board implementation of the programme depends very much on the implication of CTOs and personnel managers from the shipping companies.

5. CONCLUSIONS

In order for this program to be successfully implemented the maritime university needs to very closely collaborate with the shipping companies. A dialog and a continuous feedback are imperative because they will improve the training of the cadets at school and will make the curricula more sensitive to the needs of modern maritime industry ensuring a higher quality of the training process.

This project (as part of MARCON project) is envisioned to be a modern, integrated system of training, for senior maritime students, that respects all the legal requirements and conventions recognized at European or international level. At the centre of this project lies the on board training period, with the participation of shipping companies.

The new on board training curricula is trying to match as better as possible the theoretical level of knowledge of the cadets with the practical activities that they could do on board. The training curricula is supported with a set of individual training materials dedicated to cadets, guidelines for achieving the practical training goals and competencies. More than that, the document will present also the guidelines designed for the company and ship training officer that are monitoring and evaluating the cadets, in order to create, as much as possible, an uniform training package on all the ships.

All the documents and manuals used for individual and group training during sea time and manuals, the training handbook for the Company Training Officer (CTO) and for the Ship Training Officer (STO) all will be available for use by other maritime universities.

The end result of this program is an increase in the level of training of our students. With a better on board training experience and an improved curricula and training system we are confident that they will be better motivated in continuing their careers as seafarers, and will have better chances of being employed.

References

[1] Bârsan E. and Muntean C., 2008, *E-navigation requires new methods of training for deck officers*, 9th General Assambly of International Association of Maritime Universities – San Francisco, SUA, published in World Maritime Excellence, ISBN 978-0-615-25465-4, Pub. CALMAR, US.

[2] Bârsan E., 2007, *Key roles played by shipping companies in the MET process*, 8th General Assambly of International Association of Maritime Universities – Odessa, Ucraina, published in World Maritime Excellence, ISBN 978-966-8783-11-1, pp. 363 – 376, Pub. AO Bahva, Ukraine.

[3] Doyle E., 2007, *The Public Private Partnership Model on which the National Maritime College of Ireland was Conceived and Operates*, 7th TransNav 2007 Conference – Gdynia, Polnad, published in Advances in marine navigation and safety of sea transportation, ISBN 978-83-7421-018-8, pp. 69 – 74, Pub. Gdynia Maritime University Press, Poland.

[4] Hu J.S., Chang S.W., Chen C.T., 2007, *Social Impacts of Maritime Education – a Case Study National Kaohsiung Marine University Taiwan*, 7th TransNav 2007 Conference – Gdynia, Polnad, published in Advances in marine navigation and safety of sea transportation, ISBN 978-83-7421-018-8, pp. 69 – 74, Pub. Gdynia Maritime University Press, Poland.

[5] Kadir C. and Er I.D., 2007, *Economic Constrains on MET in Turkey*, 7th TransNav 2007 Conference – Gdynia, Polnad, published in Advances in marine navigation and safety of sea transportation, ISBN 978-83-7421-018-8, pp. 69 – 74, Pub. Gdynia Maritime University Press, Poland.

[6] Laczynski B., 2007, *Role and Situating of Practical Training of Deck Students on Training Ships*, 8th General Assambly of International Association of Maritime Universities – Odessa, Ucraina, published in World Maritime Excellence, ISBN 978-966-8783-11-1, pp. 363 – 376, Pub. AO Bahva, Ukraine.

[7] Loginovsky V., 2008, *Maritime Education and Training: IAMU and IMO Formal Research of Main Concepts and Trends*, 9th General Assambly of International Association of Maritime Universities – San Francisco, SUA, published in World Maritime Excellence, ISBN 978-0-615-25465-4, Pub. CALMAR, US.

[8] Raicu G., Bârsan E., Arsenie P., HANZU-PAZARA R., 2007, *Realistic environments for online maritime simulators*, 8th EUROSIM 2007 – Ljublijana, Slovenia, published in Proceedings of the 6th EUROSIM Congress on Modeling & Simulation, ISBN 978-3-901608-32-2, pp. 355 – 363, Pub. ARGE Simulation News, Vienna, Austria.

Smith-Robson C., 2008, *Toward an International Rubric: A Compilation of STCW Competency.*

[9] *Assesment Methodologies*, 8th General Assambly of International Association of Maritime Universities – Odessa, Ucraina, published in World Maritime Excellence, ISBN 978-966-8783-11-1, pp. 363 – 376, Pub. AO Bahva, Ukraine.

[10] Zhukov D. and Miyusov M.V.,2008, *On board training and experienced officers*, 9th General Assambly of International Association of Maritime Universities – San Francisco, SUA, published in World Maritime Excellence, ISBN 978-0-615-25465-4, Pub. CALMAR, US.

RESPONDING TO GLOBAL HUMANITARIAN CRISES: THE ROLE OF THE MARITIME UNIVERSITIES

Stephen J. Kreta,
PE, Professor and Academic Dean
California Maritime Academy
E-mail: skreta@csum.edu
Donna J. Nincic,
PhD, Professor and Chair
Department of Maritime Policy and Management
California Maritime Academy
E-mail: DNincic@csum.edu

Abstract. 2008 was a record year for natural disasters, with over 220,000 fatalities worldwide from cyclones, earthquakes, floods, and other events. Additionally, the UN Food and Agriculture Organization (FAO) estimates that more than 9.1 million people died from hunger and poverty in 2008, and in 2007 the number of undernourished people increased by 75 million globally, over and above the 848 million undernourished in 2003 – 2005. Getting necessary aid in a timely manner to the individuals and communities who need it is the objective of the field of relief chain management/humanitarian logistics. There is a need for professional education in this area: According to a Fritz Institute study of the 2004 tsunami, aid organizations suffer from a lack of trained and experienced logisticians. The world's maritime universities can play an important role in alleviating human suffering by incorporating key humanitarian elements into their academic programs. Many IAMU institutions have courses in logistics and supply chain management, and crisis response, which easily could be augmented to include an emphasis on humanitarian relief. The proposed paper will discuss how faculty in engineering, transportation and navigation, business and policy fields can address this vital global issue.

INTRODUCTION

2008 was a record year for natural disasters, with over 220,000 fatalities worldwide from cyclones, earthquakes, floods, and other events. In addition to Cyclone Nargis in Myanmar, the Philippines faced 16 typhoons, and hurricanes Fay, Gustav, Hanna and Ike collectively claimed more than 800 lives in the Caribbean. Since 1900, there have been only two years (1995 and 2005) when more damage has been incurred. Figures from the World Bank's Independent Evaluation Group (IEG) show that present-day costs of disasters are now 15 times higher than they were in the 1950s.

Additionally, the UN Food and Agriculture Organization (FAO) estimates that more than 9.1 million people died from hunger and poverty in 2008, and in 2007 the number of undernourished people increased by 75 million globally, over and above the 848 million undernourished in 2003 – 2005. To respond to this increasingly dire situation, each year the UN World Food Programme distributes more than 3 million metric tons of food to an average of 100 million people in 77 countries around the world. Approximately half of the food distributed by the WFP – the world's largest food relief organization – is shipped by sea and is unloaded in some 78 cargo ports around the world. From the responses to Hurricane Katrina in the United States to the ongoing food crisis in Somalia, maritime shipping is a key means of getting aid to the individuals and communities who need it immediately in disaster situations, or for longer periods of time in the case of more sustained events such as droughts and civil conflict.

THE MARITIME DIMENSION OF HUMANITARIAN RELIEF

The importance of the global shipping community to the alleviation of human suffering cannot be underestimated. In nearly every major disaster – natural and manmade – that has involved a coordinated relief response, shipping has been one of the main modes of relief operations, essential to the delivery of critical goods and services to the afflicted populations. More generally, while response immediately following any natural disaster is usually provided by the fastest means possible – typically air – longer-term sustained relief efforts are largely conducted by shipping. The role of shipping in disaster relief is an important component of the relatively new fields of study: specifically humanitarian logistics and relief chain management. In each, an important emphasis is placed on the role of the global maritime community as a vital component in any sustained emergency response. For example:

2004 Indian Ocean Tsunami

The undersea earthquake and resulting tsunami was one of the worst natural disasters of recent times, with over a quarter of a million people killed or missing in eleven countries. Waves up to 30 meters high destroyed entire communities and caused widespread devastation to critical infrastructure, including fishing vessels vital to the local economies. Nations of the world responded with over $7 billion in aid, including support from their naval vessels operating in or deployed to the area. Most importantly, the maritime commercial sector played a critical role in the disaster response. Merchant shipping companies were critical in getting relief supplies to areas devastated by the tsunami. In the immediate aftermath of the tragedy, several companies contributed their ships to the relief effort, while others provided services free of charge. For example, Majestic Cruises deployed its cruise ship Ocean Monarch to Indonesia to be used as a floating medical facility for victims, and the Japanese Shipowners' Association announced that its three member lines offered relief groups assistance with transporting containerized goods. NYK, K Line and MOL all provided free transport to carry relief goods. NYK donated ¥100m ($966,000) and used its 550-teu Shimanami to transport boxes of aid supplies from Singapore to Jakarta, Indonesia, at no charge.

Kashmir Earthquake (2005, Pakistan)

In 2005, a 7.6 magnitude earthquake struck the North West Frontier Province of Pakistan causing damage over an area of 30,000 sq km. 79,000 people were killed in the remote mountainous region, and over three million were left homeless. Over 6,000 schools were destroyed, 40,000 homes were either damaged or lost, as were over half of the 800 health care facilities in the region (Tatham, POMS). While response was swift and immediate, it took up to six days for most of the assistance to arrive due to the challenging terrain, inclement weather, and the destruction of roads and bridges (Tatham, POMS). All told, forty countries, five multinational organizations, and over a dozen non-governmental organizations provided assistance resulting in one of the largest internationally coordinated relief efforts to date. Much of the aid – both initially and months after the event – arrived by airfreight. While the use of air is imperative in initial days after a disaster, as it provides the fastest response, efforts are usually made to switch to road and sea transport as soon as possible to reduce costs. An important study has shown that more aid could have reached the victims of the Pakistan earthquake without a significant sacrifice of time, and at a significantly lower cost, had relief supplies been forward-positioned in strategic areas at sea prior to the event (Tatham, POMS). The authors go on to argue the importance of *sea-basing* of humanitarian relief supplies around the world, near the most disaster-prone regions, as a means of ensuring faster response times, and more lives saved.

Cyclone Nargis (2008)

The powerful storm struck the Irrawaddy Delta of Myanmar in May 2008 with 240 kph winds and a 3.5 meter storm surge. 138,000 were killed or missing, and over two million severely affected in the aftermath. 42 % of food stocks were destroyed, and some 60 % of the rice paddies in the affected area were flooded with seawater. India was one of the first countries given permission by the Myanmar government to provide assistance; Indian Air Force planes provided eight tons of relief supplies, and two vessels from the Indian Navy provided more than 100 tons of relief materials. Tragically, despite global protests, other international aid workers were not allowed into the country until nearly three weeks after the cyclone hit. The World Food Programme and many foreign countries were eventually allowed to deliver food and medical aid by air, but Myanmar's military rulers refused to allow one French and three US naval vessels carrying aid to enter the country (the French vessel alone was carrying over 1,500 tons of supplies). Great Britain dispatched the HMS *Westminster* to provide assistance, but was also refused permission for its aid to be delivered. In addition to carrying water and much-needed supplies, the military vessels also had helicopters that could have been used to deliver assistance to the more remote areas. Nearly three weeks after the hurricane struck, the military junta granted permission for commercial ships to deliver aid (it is not known how many actually did so), but was unrelenting in its refusal to allow the US, French and British military vessels to enter its waters.

Somalia

At the height of its relief efforts, the United Nation's World Food Programme carried 32,000 tons of food each month into Somalia where civil war, combined with a series of devastating droughts, have created a humanitarian crisis worse, by some estimates, than that occurring in Darfur. Between 80 % and 90 % of WFP food aid for Somalia arrives by sea and more than 2.6 million people in Somalia were dependent on food aid in 2008 alone. Land-based alternatives are problematic; it can take three weeks for a truckload of food to arrive in Mogadishu from Mombasa and drivers are often attacked. The security situation for humanitarian work is critical: In 2005 the World Food Programme had to suspend all deliveries of food assistance by sea to Somalia for several weeks due to vessel hijackings by pirates operating in the country. While many WFP vessels now receive military escort, vessels carrying non-WFP humanitarian assistance do not, and hijackings and pirate attacks have continued to impede relief efforts. Humanitarian agencies have said they are increasingly unable to help millions of Somalis due to piracy and other dangers, and they continue to warn of an "impending humanitarian catastrophe" in the country.

United States

After the 9/11 attack on the World Trade Center (2001), up to 1 million people were evacuated from Lower Manhattan by water in a spontaneous response of privately and publicly owned watercraft. Additionally, immediately following the 1989 Loma Prieta earthquake in California, ferry service between San Francisco and Oakland, which had ended decades before, was restored. Crowley Maritime (a private corporation), largely acting alone, provided the ferry capability as an emergency response service within three hours of the earthquake, due to the collapse of a section of the critical San Francisco-Oakland Bay Bridge, thereby saving those stranded by the loss of the bridge hours of transit time. The service was offered free of charge for a day and a half, with substantially reduced, state-subsidized fares implemented after that. (Nincic, 2007).

THE ROLE OF THE MARITIME UNIVERSITIES

"Contemporary maritime education seems to place excessive emphasis on cramming students with inadequate knowledge and skills required to operate ships. What this does is to produce seafarers who lack pride in their work, and do not posses a true seaman's spirit."

Dr. Yohei Sasakawa
Dalian, China

Collectively, those of us involved in Maritime Education and Training (MET) around the world should feel inspired and challenged by such a strong statement. While it might be easy to blame this lack of *spirit* on our students, our culture and society, increasing technology, STCW standards or "the other professor in the next classroom," in reality we all share the responsibility to produce appropriately prepared seafarers and maritime professionals. But before we can discuss changes to MET, we must first define what we mean by the *seaman's spirit.*

Educating the whole mariner: Instilling the *seaman's spirit*

It can be argued that one of the strongest bonds shared by seafarers is a deeply felt commitment to help a fellow seafarer in need or distress. We recognize the inherent dangers in our profession, and we have always been prepared to go out of the way to help our fellow seafarers in times of crisis or emergency. Navigators are trained and educated to choose the most efficient routes between ports, and engineers to run the engines at optimal speeds and efficiencies to help the shipping company fine tune systems and keep operating costs as low as possible. However, immediately upon getting a distress call, the engines are placed at full ahead, traffic patterns altered, weather warnings ignored and the ship is headed in the direction of the call. Whether this behavior to help others in distress at sea is instilled or inherited, this selflessness is a reflection of the true *seaman's spirit.*

Maritime universities across the globe appropriately are expanding their traditional roles of "training" navigators and engineers for ships to include more comprehensive maritime studies, including the business and policy of shipping, maritime law and economics and environmental issues relating to the sea and to climate, and the increased importance of inter-cultural communications – these are all vital to keep up with a rapidly changing maritime world. But perhaps it is also time to take advantage of the natural inclination of mariners to help others to expand the nature of the *seaman's sprit* by including an increased study of ethics and humanitarian efforts in our curricula. As mentioned earlier in this paper, humanitarian and disaster relief efforts are accomplished to a significant degree by ships and other sea-borne traffic; it is expected that this will continue and even expand into the future. While these efforts are carried out by seafarers trained and educated by the world's maritime universities, how many seafarers truly understand their unique role in responding to the ever-growing numbers of humanitarian crises in the world and seek professions in the fields that plan and implement these relief efforts?

The concept of humanitarian relief is certainly not new to maritime training programs. For example, in 1948 cadets from the California Maritime Academy participated in "CALIFORNIA FRIENDSHIP," a 4-month, 21,000 mile training cruise that loaded milk, food and clothing at California ports and delivered them to cities in Europe and the Mediterranean that had been devastated by World War II (Appendix A). To this day, a training cruise just does not seem complete without the students organizing a toy and clothing drive to one or more orphanages in the ports they will visit on their annual training cruise.

Educating for humanitarian relief

The American Association of Colleges and Universities (AACU) recently developed a program called "Liberal Education and America's Promise" (LEAP) outlining the essential learning outcomes of any educated person. One of the four essential outcomes categories is:

"Personal and Social Responsibility which includes; civic knowledge and engagement, intercultural knowledge and competence, and ethical reasoning and action; anchored through active involvement with diverse communities and real-world challenges" ("Liberal education").

Each of our existing departments and programs in our respective maritime universities can contribute to this outcome in very real ways; ways which will develop and foster pride and a strong work ethic in our students – and instill a new spirit of responsibility and sense of place in the maritime world in our graduates.

Today's modern maritime universities have all the pieces in place for preparing professionals for sea-going and shore-side positions with many options and opportunities. We have the programs, the infrastructure, the technology, the experience and the know-how. We should feel obligated to take MET to the next level, to restore the *seaman's spirit*, because we also share traditions of social responsibility and we share the oceans. We owe it to those who came before us and to those who will come after us to expand this spirit and desire to assist not only those in distress on the seas, but those on the shorelines and those inland who can best be helped by the efforts of the maritime community.

Suggestions have been made about how academic institutions can expand their role in humanitarian relief efforts. For example, in 2003 the Fritz Institute, one of the world's leaders in humanitarian logistics, and Georgetown University laid out a series of guidelines to prepare professionals for humanitarian work and to instill a greater sense of awareness of the roles the academic community can play in alleviating the impact of natural and human disasters (Appendix B). Two important suggestions included the development of "multi-disciplinary curricula to prepare students for careers in humanitarian work" and the need to "increase awareness in the university community of the benefits of providing programs focusing on humanitarian fields, especially in the social sciences."

It has been said that the life of a mariner is hours of boredom interrupted by minutes of sheer panic where decisions have to be made instantaneously that could have significant safety and fiscal implications. Maritime Universities have always implemented this kind of understanding. Mariners thrive in an environment where situational awareness is the key. Training for and understanding the evolution of emergencies, coupled with an acute awareness of what is happening at the time and knowing the tools available, are what allows a decision maker to act swiftly, firmly and effectively. When the tools available include - in addition to the technical and social-political tools mentioned above - strong ethical reasoning and social responsibility, the results can be expected to bring higher rates of success. Due to the uncertainties of timing, severity, and location of humanitarian disasters, humanitarian logistics and relief chain management are skill-sets that require quick thinking, immediate action and fast paced decision making.

The following explains briefly how faculty in MET institutions and programs can and should incorporate some of the practical applications of humanitarian relief concepts into either new or existing coursework for their majors.

Marine transportation (Navigation)

The faculty of Navigation or Maritime Transportation teach most of the aspects of ship and cargo handling. Examples of containerized or bulk cargo for relief missions such as are needed for humanitarian efforts can be included in courses of stability, cargo handling and port and terminal management. Many Maritime Universities also teach courses in the business of shipping and logistics through their programs of Navigation Studies, but for this paper, these topics will be covered under the Programs of Business. In addition, discussion of career opportunities with maritime international aid organizations such as Mercy Ships, or OM Ships International will provide the impetus for teaching about the important role that maritime organizations have with humanitarian efforts.

Engineering (Logistics; technological innovations)

Logistics and Supply Chain Management (SCM) are the terms usually introduced to teach about efficiencies and the effectiveness of moving goods and services from the beginning of an operation through its conclusion, regardless of whether that operation is production, sale and distribution, or product waste removal. While Logistics and SCM are often taught from the schools of Business, there are many programs where these courses are taught from the Engineering Schools, as in many ways, the theories and tools are similar to those studied in programs such as Industrial Engineering. Industrial Engineering courses cover a broad base of studies such as Operations Research, Engineering Management, Queuing Theory and Optimization. Issues and breakthroughs in the development of Humanitarian Logistics and Relief Chain Management are offshoots of traditional Logistics and SCM studies and in the United States are growing from Engineering Schools in such Universities as the Massachusetts Institute of Technology (MIT), the Georgia Institute of Technology (Georgia Tech) and

Stanford University. For those institutions, such as Princeton University for example, that do not have Business Schools or do not offer undergraduate Business degrees, they prepare many future business leaders through programs leading to a Bachelor of Science in Engineering.

Additionally, Engineering Schools can address other critical issues when responding to humanitarian disasters. This could include power generation, water purification, communications, port and harbor infrastructure development and repair, and a wide assortment of environmental issues such as clean-up and sanitation systems.

Business Administration

Whether taught through the programs of Navigation, Engineering or Business Administration; Logistics and SCM are the key elements in the development of successful and timely responses to humanitarian disasters. Issues such as time to delivery, inventory, warehousing, permits, traffic patterns, points of entry, legal issues such as customs and immigration, and economies of scale are critical to the mission. To save lives and reduce the complications of disease, it is imperative that decisions of the movement of these goods and services are made efficiently and effectively and to ensure minimum waste.

Computer Science

There are numerous issues involving technology and computer science that are important to the delivery of humanitarian goods and services. Effective wireless communications, Geographic Information Systems (GIS), Global Positioning Systems (GPS) satellite tracking and surveillance, and inventory control are all tools that will be critically important to the decision makers and on scene personnel in areas hit by natural or man-made disaster. Conditions change rapidly at these times and effective, timely and accurate information sharing is crucial. Computer Simulations can be developed beforehand to test the effectiveness of response plans; additionally appropriate simulation systems can be used during an emergency to predict outcomes.

Maritime Policy

Effective humanitarian disaster relief is not possible without an understanding of corporate, local, national and international policy. Many organizations including relief agencies, police, fire, military and other government agencies will respond to a natural disaster, and only a coordination of efforts will ensure an effective response. From the maritime response perspective, bringing supplies stored around the world and delivered to a single point of entry will cause major logistical issues, and how these issues are dealt with during an emergency will be integral to the success rate. To avoid making costly and embarrassing mistakes, a strong understanding and appreciation of the area's political, economic, cultural, religious and historical perspectives will be among the most important resources a responder can bring to a crisis situation.

CONCLUSION

As Dr. Sasakawa noted in his opening remarks to IAMU AGA 7 in Dalian, China:

"It is said that without the contribution of seafarers, half of the world would freeze and the other half would starve. This underscores the important role of these people who work on the frontlines of maritime transportation."

Those of us at the forefront of Maritime Education and Training play a critical role in ensuring that all of our students are not only prepared to undertake their jobs in a professional and efficient manner, but that they also bring to their work a true sense of the *seaman's spirit*, pride in what they do, and an awareness of the vital role they play not only in the economic life of the world, but in the relief and assistance they can bring to those less fortunate, and in the times of their greatest need.

References

[1] Challenges of Disaster Management Education. (2003, March 13 – 14). Proceedings. Georgetown University and the Fritz Institute. Washington DC. fritzinstitute.org/ GeorgetownEducation.htm.

[2] Liberal education and America's promise. American Association of Colleges and Universities. aacu.org/leap/.

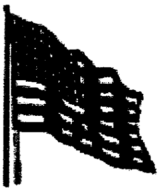
[3] Nincic, D. (2007). Maritime security education and training: Establishing a learning community and framework for program goals and outcomes. In Zhukov, D., ed. World maritime excellence: Proceedings of the 8th annual general assembly and conference of the International Association of Maritime Universities. Odessa, Ukraine.

[4] Sasakawa, Y. (2006). Development for a new world maritime community. Speech delivered at the 7th General Assembly of the International Association of Maritime Universities, Dalian Maritime University, Dalian, People's Republic of China.

[5] Tatham, P. & Kovács, G. (2007). An initial investigation into the application of the military sea-basing concept to the provision of immediate relief in a rapid onset disaster. Presented at the POMS 18th Annual Conference, Dallas, Texas, U.S.A., May 4 to May 7.

Appendix A

STATE OF CALIFORNIA
UNITED STATES OF AMERICA



CALIFORNIA MARITIME ACADEMY
OPERATING
TRAINING SHIP GOLDEN BEAR
ON
OPERATION "CALIFORNIA FRIENDSHIP"

SHIPPER: *The People of the State of California, U.S.A.*

CONSIGNED TO: PEOPLE OF FRANCE

NOTIFY: AMERICAN AID TO FRANCE

PORT OF LOADING: STOCKTON, CALIFORNIA

PORT OF DISCHARGE: MARSEILLES, FRANCE

STRAIGHT BILL OF LADING—NOT NEGOTIABLE
FOR SHIPMENT ON TRAINING SHIP GOLDEN BEAR
ON ANNUAL TRAINING CRUISE—1948—B/L No. 5

MARKS	CONTENTS	CUBIC FEET	FREIGHT AND CHARGES
AMERICAN AID TO FRANCE	FOOD CLOTHING	692	FREE

In witness whereof the Governor of the State of California has signed four bills of lading, one of which being accomplished the others stand void.

Earl Warren
Governor of the State of California

Dated at STOCKTON *California, U. S. A.,* 15 JANUARY *, 1948.*

Appendix B

Georgetown University and Fritz Institute:

Challenges of Disaster Management Education

Suggestions for Universities

Work with agencies to design educational and training programs that meet the needs of the agencies.

Develop multi-disciplinary curricula to prepare students for careers in humanitarian work.

Seek faculty within the various disciplines who want to teach and research humanitarian issues.

Increase awareness in the university community of the benefits of providing programs focusing on humanitarian fields, especially in the social sciences.

Make available adjunct faculty and short-term sabbatical research opportunities for operational agency staff.

Encourage faculty who are embarking on field research to contact and gain the assistance of humanitarian and development agency staff operating programs in the research areas.

Facilitate cooperation and communication among university programs devoted to aspects of humanitarian studies and research.

Create partnerships with developing country institutions

Devote resources to capacity building as appropriate

Encourage faculty and student exchanges

Consider establishing an academic association of humanitarian studies and/or a dedicated journal.

DETERMINING INTERNAL SOLUTIONS TO BRING MORE VIETNAMESE SEAFARERS TO THE GLOBAL WORLD OF SHIPPING

Nguyen Thanh Thuy,
Dr. Sc., Vietnam Maritime University
Email: ngthanhthuydhhh@vnn.vn; ngthanhthuy@gmail.com

Abstract. Today ship owners are facing a shortage of well-trained seafarers who would like to work at sea in permanent jobs as ratings or officers. In Europe, America and some countries in Asia like Japan, South Korea and Taiwan, hiring foreign seafarers is a long standing solution for ship owners. This has created a huge number of jobs for people from developing countries like the Philippines, India, Indonesia, China and Vietnam. Vietnam has a young population eager to increase their standard of living and therefore there is a potential pool of labour for the maritime world to tap into. However, the number of Vietnamese seafarers who are working on foreign ships is still very limited. This paper deals with two main sets of reasons explaining the above situation: (1) issues dealing with management and policies; and (2) issues dealing with working qualifications. The first issues are related to the government's labour manning strategic planning policies, the policies of crew manning, the quality and training process of training organisations, the relationship between the trainers and the employers, and so on. The later one relates to the working habits and working skills of Vietnamese seafarers, their health condition and language abilities, etc. Subsequently, the author suggests solutions which can help solve these problems in order to increase the amount of Vietnamese seafarers working on foreign ships. Needless to say the impact of the current financial crisis is hard to foresee. It remains to be seen if the crisis will solve the shortage problem or actually exaggerate the problem as current seafarers may find other jobs while 'their' ships are being laid up.

1. INTRODUCTION

Nowadays, ship owners worldwide are facing the shortage of well-trained seafarers who would like to work at sea permanently. There are many reasons causing this shortage of seafarers globally. First of all, as estimated by BIMCO/ISF (2005), the current total global demand for seafaring officers is 476,000 and for ratings 586,000 in the same year. However, the worldwide supply of seafarers in 2005 is estimated to be 466,000 officers and 721,000 ratings, which indicates a modest theoretical worldwide shortfall of 10,000 officers or 2 % of the total workforce, as being shown in Table 1. Secondly, another statistic of BIMCO/ISF (2005) announced that the world fleet continues to rely heavily on officers from Europe, North America, Japan and other OECD countries (OECD means "Organization for Economic Cooperation and Development"). Nevertheless, over 25 % of these are over 50 years old, and well over 50% are over 40. Most are in senior positions such as Masters or Chief Engineers. The impact of their retirement, without adequate numbers of well trained and experienced replacements, could be severe. The next reason comes from seafarers themselves, as a good part of the talented seafarers do not want to work at sea through out of their lives because working on board is a hard and potentially dangerous job while onshore-jobs are equally rewarding with a lot of accompanied advantages such as time for family, more social activities and even more chances for social positions. The last two reasons relate to the fact that the number of well-trained seafarers may decrease beyond the data estimated by BIMCO/ISF in the future. In addition, the crisis is making the maritime officers from the developed countries seriously look for other shore based jobs and this situation open up more opportunities for seafarers from developing countries.

Under those circumstances, in Europe, North America, Japan and other OECD countries as well as some countries in Asia as South of Korea and Taiwan, hiring foreign seafarers is a solution for the ship owners. And this has created a huge number of jobs for labour from the Far East, the Indian sub-continent, Eastern Europe and East Asia. In Asia, among developing countries like the Philippines, India, Indonesia, China and Vietnam, the Philippines have become the biggest seafarer exporting country in the world. The total number of Filipino seafarers makes up from 19 % to 20 % of the total number of seafarers in the world, which brings almost 7 million US dollars to the Philippines annually. Nevertheless, from the year 2003 to the year 2008, the number of Filipino seafarers has not increased but stayed around 230,000 seafarers and even decreased in the year of 2007 and 2008, which raises the question if the Philippines have reached their limitation as a maritime labour pool? China is going to take after the Philippines, which has seen a significant increase in maritime labour supply, although most of the additional workforce is currently used by the Chinese owned fleets to meet the expansion of Chinese domestic requirements. Most Chinese crews still experience English language difficulties. As a result, ship owners and ship managers are now looking for diversification to other sources of seafarers which may bring chances to other countries including Vietnam.

Table 1

Demand and supply of seafarers worldwide

	2005				2015 (Estimated)	
	Demand	Supply	Balances	%	Balances	%
Officers	476,000	466,000	-10,000	-2.1	-27	-5.9
Ratings	586,000	721,000	135,000	18.8	167	21.6

Source: BIMCO/ISF (2005) estimates

2. ADVANTAGES OF VIETNAM IN IMPROVING ITS SEAFARER SOURCE

2.1. Geography

With a long maritime tradition with more than 3,260 km of coastline creating the S-shape and about 10,000,000 sq. km area of economical privileges, it is obvious to improve Vietnam's maritime potential. Besides, Vietnamese inhabitants have a long tradition of living along the coast and working at sea as fishermen.

2.2. Population

Vietnam has a young population, with 75 % of the population being under 30 years of age, eager to increase their standard of living. This is a potential pool of labour for the maritime world. In contrast to the developed countries, working at sea is still a desire harboured by many young Vietnamese men. This situation is another reason for improving and promoting the pool of seafarers in Vietnam.

2.3. Maritime education and training system

Vietnam's good basic maritime training system has been recognised by the International Maritime Organisation (IMO) from the year of 2001. Maritime schools and maritime universities in Vietnam have provided a good basis for educating seafarers in different working levels with an annual intake of students of more than 5,000. To this point Vietnam has been listed in IMO's initial STCW White List, meaning the maritime education and training system of Vietnam has reached the international standard required by IMO.

The characteristics of the MET system of Vietnam are illustrated as follows: Even though the MET organisations are managed by different ministries, the MET curriculum and programs are controlled by the Ministry of Education and Training. In order to guarantee the professional quality of the MET curriculum, all MET organisations have to meet the requirements of the following bylaws:

(1) All MET organisations must hold the entrance examination under the regulations of the Ministry of Education and Training of Vietnam.

(2) All MET organisations must train seafarers under the requirement of International convention on standard of training, certification and watch keeping for seafarers (STCW 95 CODE), unless some education and training schools and colleges belonged to other ministries than the Ministry of Transport which simply train domestic seafarers.

(3) All rating candidates and officer candidates must have obtained their high-school diplomas.

(4) The studying and training time is 4.5 year for universities, 3.5 years for colleges, and 2.0 years for intermediate schools (secondary schools).

(5) The training curriculum consists of basic subjects, professional subjects, English and training courses.

Fig. 1 presents the MET system of Vietnam in which there are many ministries involved in the MET system. Fig. 2 illustrates the links among all levels of MET in Vietnam.

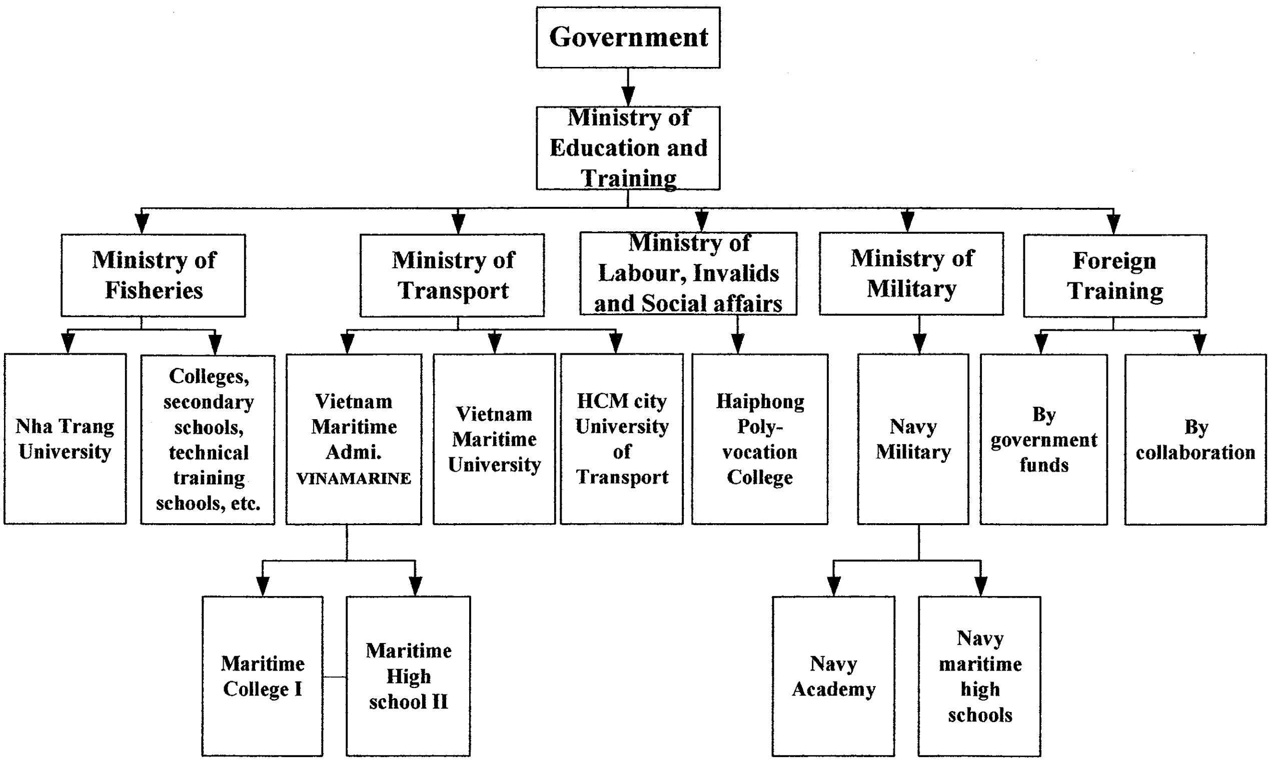


Fig 1. The MET system in Vietnam [4]

In Fig. 2, first class is for officers of ships of 3,000 GT and over, engineers of ships with a main engine output of 3,000 KW and over. Second class is for officers of ships of 500 GT and less than 3,000 GT, engineers of ships with a main engine output of 750 KW and less than 3,000 KW. Third class is for officers of ships of 100 GT and less than 500 GT, engineers of ships with a main engine output of 150 KW and less than 750 KW. Fourth class is for officers of ships of less than 100GT, engineers of ship with a main engine output of less than 150 KW.

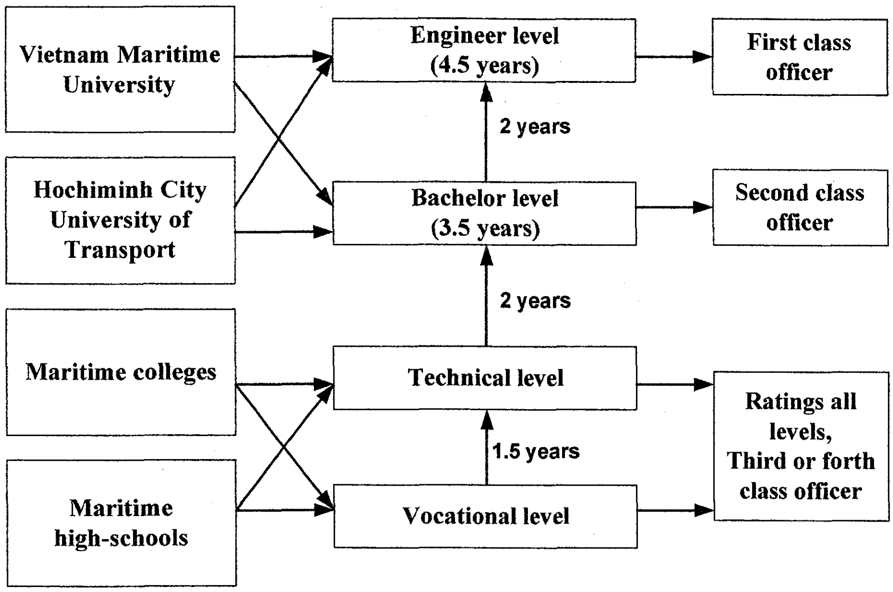


Fig. 2. Links among all levels of MET in Vietnam [3]

2.4. Maritime sector

Developing the maritime sector in Vietnam has high priority for the government. Vietnam has been the chairman of the ASEAN Maritime Transport Working Group from 2008 – 2009, where meeting number 15th was held on April 23 – 25, 2008 by the Vietnam Maritime Administration. The Ministry of Transport has required that all of its MET organisations follow the requirements of the International convention on standard of training, certification and watch keeping for seafarers (STCW 95 CODE). Until now Vietnam has joined 15 conventions and circular letters of IMO and is considering of joining more. At the same time, the Vietnamese government is working on a strategic plan in order to improve the maritime sector of Vietnam nationally and internationally.

2.5. Vietnam's seafarer competitive waging scale

Until now most Vietnamese seafarers are working for ship owners in Japan, South Korea and Taiwan while only few work for European ship owners. It can be said that generally the Vietnamese seafarers have accepted the much lower wages than those of European, Chinese, Filipino seafarers and even lower than the wages defined by international regulation. There is only one exception for the seafarers working for VINIC (Centre for Training and Improvement of Maritime Professions) – an exporting seafarer centre which belongs to Vietnam Maritime University, which grants almost the same wage levels as the international levels. Despite the fact that Vietnam's seafarers usually work in smaller ships, the Vietnamese wages are lower than those of other nationalities even in the same position in the same size ship. Table 2 shows the competitiveness of Vietnamese seafarer waging scale.

3. PRESENT PROBLEM OF VIETNAM CONCERNING TO THE SOURCE OF SEAFARERS

3.1. Lack of policies in crew manning and weak government control

Vietnamese seafarers are managed mainly by crewing agents or shipping companies while the Vietnam Maritime Administration issues Seaman Passports or Working Certificates for seafarers only. It can be said that the seafarer market tends to be out of control of the government. The pool of seafarers tends to be separate from the shipping companies themselves and thus they have become “a source of free labour”. This trend means that the government cannot control the actual number of seafarers.

Another set of circumstances has occurred when some seafarers could not complete their work tasks or broke the principles of a ship; they were then signed off by the master. The other side of the coin, however, is that these seafarers can easily quit the job in their present company and move to another company to continue working without any serious punishment.

The Vietnamese government does not have a proficient tracking system to follow the situation of seafarers as well as protect Vietnamese seafarers after they signed on to foreign ships. Therefore, some Vietnamese seafarers have been treated unfairly by other nationalities working on the same ships. Some others illegal immigrated into other countries when their ship was in port.

3.2. Limitation of number of high quality maritime training centres

Presently, there are a number of MET organisations located in the North and South of Vietnam. Each MET organisation has its own maritime training centre but only the ones belonging to the Ministry of Transport have been able to maintain the high quality of training. As for training seafarers for the domestic market only, some MET organisations belonging to other ministries have lowered their training requirements but lengthened the education time instead. The main explanation is that they do not have enough necessary training equipment such as training ships or simulation systems.

Table 2

Worldwide seafarer’s waging scale

Nationality	Master	Nationality	AB Rating
Denmark, France, Japan, Norway	> USD 9180	Denmark, France, Norway, Sweeden	> USD 2925
Germany, UK	USD 8161 - 9180	Germany, the Netherland, Spain	USD 2601 - 2925
Italy, the Netherlands	USD 7141 - 8160	Greece, Italy	USD 2276 - 2600
Greece, Polan, Spain	USD 6121 - 7140	South Korea	USD 1301 -1625
South Korea, Croatia	USD 5101 - 6120	Croatia, India, Philippine, Poland, Russia, Ukraine	USD 1185 - 1300
India, Philippine, Russia, Ukraine	USD 4081 - 5100		
Vietnam	USD 2025 - 3150	Vietnam	USD 560 - 1300
in which VINIC	USD 3500 - 6100	*in which VINIC*	USD 880 - 1300

Source: [1] and data from Vietnam Maritime Administration, Center for Training and Improvement of Maritime Professions (VIMARU).

3.3. Long educating time at MET organisations

In the current MET system, students have to spend a total 5.5 to 7.5 years in order to become a maritime officer. This time includes: 4.5 years in university plus 12 months as a training officer on board with a Training Record Book or 36 months working on board with the aim of achieving the Certificate of Competency (COC). This long time of education is a big disadvantage for increasing the number of seafarers.

3.4. Shortage of seafarers even for domestic market

Though maritime schools, maritime universities and other MET organisations in Vietnam have an annual intake of more than 5,000 students and trainees, the number of Vietnamese seafarers who are working on foreign ships is still limited, barely more than 3,000 persons until the year of 2008. The shortage of seafarers is evident even for domestic ship owners while there is a large number of young males who wish to work on board but do not have the opportunity to be trained. However, many seafarers have to be kept waiting in line as “crews on vacation” before being signed on board. In addition, many well-trained seafarers have decided to move ashore to work after a short time working at sea which also causes the lack of seafarers to become more serious. Despite the struggle of MET organisations to take more students annually, many seafaring students have changed to other careers after their graduation due to the global economics crises which has brought a lot of ships into mothballs.

Fig. 3 illustrates the supply and the demand of officers in the domestic market of Vietnam presently and estimated until 2010.

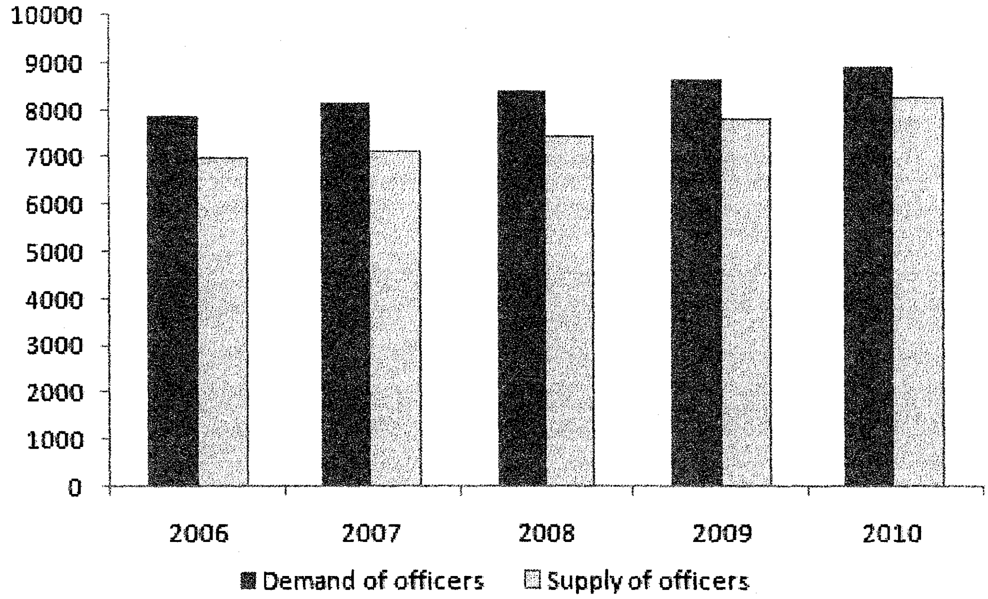


Fig. 3. Demand and supply of officers in domestic market of Vietnam presently and estimated until 2010

3.5. Weak connection between the trainers and the employers

One of the reasons contributing to the shortage of seafarers is the weak connection between the MET centres and the employers or ship owners or their agents. Many MET centres in Vietnam do not have any relationship with the foreign ship owners. Therefore, after training the seafarers only have certificates for their work but they do not know where and how to apply for a job. To apply for a new job at a crewing agent or in a shipping company, may take at least some months. This time is "wasted time" for seafarers. Assuming that each new seafarer takes 6 months to find a job, if we multi 6 months with a number of new seafarers annually, the number collected will be a great amount of "wasted time". Additionally, the well-trained seafarers hardly find a chance to work for European ship owners because there is no European shipping agent present in Vietnam. The weak connection between the trainers and the employers also affects to the quality of the training process when the trainers do not understand the demand of the maritime labour market.

3.6. Disadvantages of Vietnamese seafarers' working qualification

Foreign ship owners have complained about Vietnamese seafarers' working skills and working principles. They said that Vietnamese seafarers not only have trouble obeying to the working principles but also have inferior working skills even though they usually work hard. This may be due to the fact that many Vietnamese seafarers originally are from the countryside and the MET centres disregard training them for the principles of hard work required internationally. Furthermore, many Vietnamese seafarers have considered their seafaring career as a temporary job for a certain period in order to gain money for living. Thus they do not wish to spend more time and money to improve their working skills.

Another complaint is the Vietnamese seafarers' poor English ability which is considered another disadvantage of Vietnamese seafarers. Furthermore, Vietnamese seafarers' weak health condition has brought them a lot of problems when some of them get sea-sick and cannot work on board during stormy times or find it hard to do some tough tasks.

4. DETERMINING INTERNAL SOLUTIONS FOR IMPROVING THE NUMBER OF VIETNAM'S SEAFARERS WORKING FOR FOREIGN SHIP OWNERS

4.1. Cluster of issues concerning governmental management and policies to be enhanced by Vietnamese government

At the outset, it is necessary to establish an independent department of seafarer management which is in charge of all of activities to manage and support seafarers in order to improve the governmental management in this sector, as shown in Fig. 4. With the intention of managing the actual number of working seafarers, all shipping companies and crewing agents as well as seafarers themselves should register with this department in order to have crew working certificates for seafarers. This department also has the right to apply some penalties for the seafarers who break the contract or cannot accomplish their jobs as undertaken in the working contract. In order to export more seafarers worldwide, the Vietnamese government should consider of lifting barriers for foreign crewing agents so that they can work in Vietnam and thus facilitate the connections with international ship owners. These agents will bring Vietnamese seafarers to European ship owners faster and more efficiently.

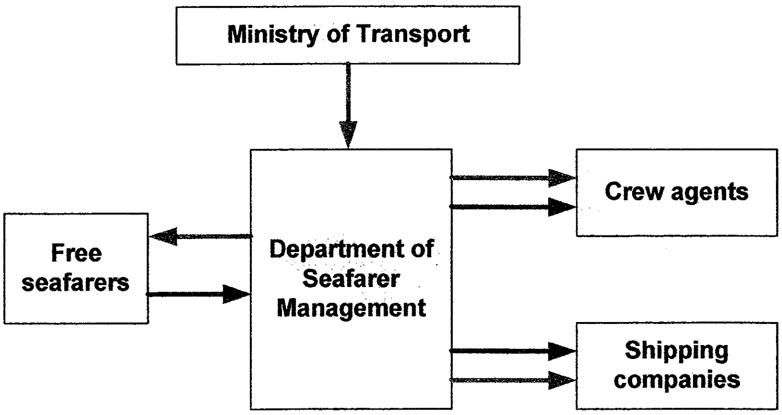


Fig. 4. Establishing the Department of Seafarers Management

The next issues may help to attract more people interested in the seafarer's career, it is to enact preferential policies such as applying a special low rate of income tax for seafarers. In addition, the Vietnamese government should pay attention to policies protecting Vietnamese seafarers as well as policies assuring their working conditions while working on foreign ships.

The government may allow a loan for people who wish to work at sea but do not have finance to follow the MET curriculum and training courses in MET organisations. In order to guarantee that the finance will be paid back, those people should sign working contracts with certain ship owners, which last for a certain period, after their graduation.

As presented previously, the demand for seafarers has been larger than the supply even for the domestic seafarer market, especially the shortage of officers is evident. Therefore, the most important duty of MET organisations is to increase the number of officers annually. Some MET organisations have solved this problem by enlarging the student intake, for instance the case of Vietnam Maritime University (VIMARU). Previously, the annual student intake for seafarer's career at VIMARU was about 250 before

2005, but after 2005 this number has increased to 500 students in 2005 and 800 students in 2008 in the regular system. It means that all of those students have the potential to become officers after graduating from university and finished their sea training periods. This is a future source for seafarer's which step by step will increase the supply of officers.

Another method to solve the balance between demand and supply is to shorten the education time while lifting the quality of the training time and lengthening the training time, as shown in Uy (2009). Currently, students of universities still have to study many side-subjects which do not support the maritime career. This studying process extends the educating time and therefore lengthens the time it takes to become a maritime officer. Fig. 5 shows the shortening process of the education time until the year of 2015 applied in Vietnam Maritime University.

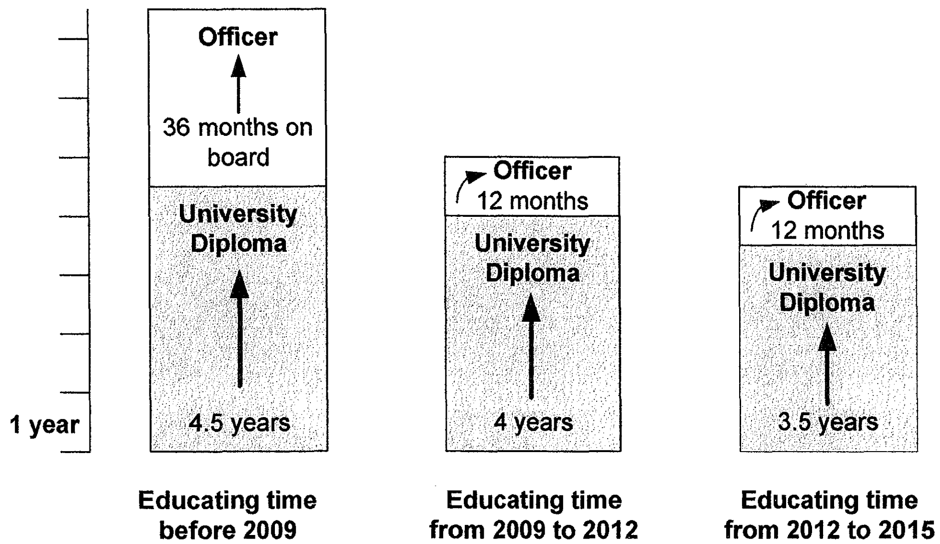


Fig. 5. Educating time applied for Vietnam Maritime University until the year of 2015 [4]

As for the training quality of MET organisation, Vietnamese government requires all MET organisations to apply the Qualification Management System of ISO 9001:2000 (International standard organisation 9001:2000). Besides, each MET organisation is requested to build its own qualification standard requirements. On the other hand, the government should consider of establishing a Department of Ombudsman to undertake the inspecting activities for all MET organisations in any ministry, in which all of ministries involved with MET organisations should. Another solution is that MET organisations need to attract more funds from government, other finance organisations and shipping companies to invest in more modern training equipment because seafarers cannot have good working skills if they are not trained by a modern training process and equipment.

All MET organisations in Vietnam should be strongly encouraged to cooperate with other MET organisations in other developed countries in order to improve the qualifications of MET courses so that Vietnam will take a major step into supplying quality seafarers and not just low cost seafarers as is presently the case.

Because the MET system is only in the North and in the South of Vietnam while there is a large number of potential seafarers in the central area, it is necessary to extend the MET system network to the central part of Vietnam. Building some more training centres for seafarers in the central part of Vietnam is an urgent task. Fig. 6 suggests the positions of the new training centres.

4.2. Cluster of issues on improving the working qualifications of Vietnamese seafarers determined by MET organisations

First of all, MET organisations should lecture and educate seafarers according to international basic working principles and working skills. In the training process, it is important to set up an evaluating system to limit the unnecessary activities when during on training ships. Moreover, through many standard examinations, seafarers will fully understand the importance of why the working principles should be followed exactly.

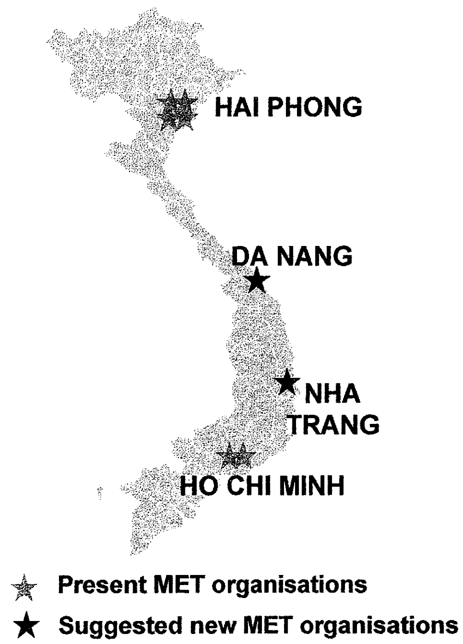


Fig. 6. Present and suggested new MET organisations

With the intention of improving the international working ethics for seafarers, each MET organisation should educate seafarers in how to work with other nationalities and focus on cross cultural communication and understanding. Besides the theories, MET organisation should invite experienced masters or officers, who have been working for foreign ship owners, to lecture about the necessity of good working manners for seafarers.

Vietnamese seafarers' English ability and communication skills are a problem while working on foreign ships with other nationalities. The question is if the English curriculum which focuses much on writing and grammar while speaking is mostly the working English on board only is good enough. Therefore, it is necessary to revolutionize the English curriculum and the duration of study. This new curriculum should concentrate on professional working English and is taught continuously every semester throughout their studies. On the subject of improving seafarers' speaking and listening skills, native English teachers should be invited to tutor seafarers in the last period of the training process.

The training process of the MET system has to pay more attention to improving the health of Vietnamese seafarers by adding more physical exercises as a mandatory subject into the training. Each MET organisation should invest in a fully equipped physical training centre.

5. CONCLUSIONS

In order to figure out how to bring more Vietnamese seafarers to the global world of shipping, first of all this paper presents the advantages of Vietnam in improving its pool of seafarers. Subsequently, the problem for Vietnamese seafarers has been reviewed and evaluated as six disadvantage points. To solve these disadvantages, two main clusters of issues are classified as internal solutions for increasing the number of Vietnamese seafarers working for foreign ship owners, they are: Cluster of issues concerning governmental management and policies to be enhanced by the Vietnamese government, and clusters of issues on improving the working qualifications of Vietnamese seafarers determined by the MET organisations. These internal solutions bring draft suggestions of how to solve the problem of Vietnamese seafarers and bring more Vietnamese seafarers to the global world of shipping.

References

[1] BIMCO/ISF (2005): BIMCO/ISF Manpower 2005 Update - Summary. The Worldwide Demand for and Supply of Seafarers. BIMCO/ISF/Warwick Institute for Employment Research.

[2] Solanki, I. & Nakazawa, T. (2007): Empowering Seafarer – Role of Maritime Universities. World Maritime Excellent. Proceedings of the 2007 IAMU Assembly, Odessa, Russia, pp. 387 – 399.

[3]. Uy, D. V & Duong, P. X (2007): The improvement of Higher MET at Vietnam Maritime University by enhancement of the linkage with industries and international relations, E-proceedings of TransNav 7th International Symposium on Navigation, Gdynia Maritime University, Poland, pp. 679 – 684.

[4] Uy, D.V (2009): Research on Improving the Maritime Training Capacity of Vietnam's MET system in order to enhance the maritime labour source from 2010 to 2020 (In Vietnamese). A prioritised scientific project of Ministry of Transport of Vietnam.

[5] Winchester, N., H. Sampson & T. Shelly (2006): An Analysis of Crewing Levels. SIRC Global Labour Market Survey. Seafarers International Research Centre. ISBN:1-900174-27-8.

[6] Wu, Bin, G. Shen, G. & L. Li (2007): The Transformation of the Chinese Labour Market for Seafarers, SIRC: Cardiff University, ISBN 1-900174-33-2.

[7] Data provided by Vietnam Maritime Administration, Vietnam.

EFFECTIVE IMPLEMENTATION OF SAFETY MANAGEMENT SYSTEM (SMS): AN OVERVIEW OF THE ROLE OF THE HUMAN ELEMENT

Mohye El Din El Ashmawy,
Captain MSc. MET (WMU)
AAST-MT Consultant for Supporting Job Opportunities and WMU Affairs
IAMU News and Journal E. B Correspondence African Region
Arab Academy for Science, Technology and Maritime Transport
E-mail: mohyldin_a@yahoo.com, mohyldin@aast.edu

Abstract. The human element is an expression commonly used in the context of the maritime industry. The human element is a complex multidimensional issue that plays a most vital role in enhancing maritime safety, security and marine environmental protection. It embraces the integral spectrum of human performance of ships' crews, shore-based personnel, organizational bodies and others. All should cooperate to address human element issues. It is recognized that the quantification of the human element in general and its role can influence the methods of upgrading safety management systems. For Maritime Education and Training (MET), the issue should be how to provide the human element with the proficiency and competence necessary to accomplish the set MET objectives. To achieve satisfactory standards for safety management, it is very important to promote safety culture through providing specialized training during the academic stage. The excellence of MET rests on the substantial intention and designation of the quality and efficiency of the human element. Thus, these two crucial elements of MET should be the target of any sound educational system. From the perspective of Safety Management System (SMS), the crucial factor is the successful implementation of the said system, which depends on the selection of the proper human elements to occupy positions affecting performance. When a safety management system is thus oriented, it becomes a living working system. This paper addresses the relation between successful implementation of SMS and the selection of the personnel who are in charge of implementing this system.

1. INTRODUCTION

The history of shipping industry has taught us that maritime safety is a plural amenability and it is furthermore complicated and of great significance. It makes obligatory a contribution from all people involved in the maritime community such as master and crew, the maritime authorities, ship-owners, classification societies, and any other party within that community.

The ultimate success of improving maritime safety depends on the dedication and proficiency of a whole range of people who make a contribution to the implementation of IMO standards.

Accordingly, maritime safety becomes an integral and significant part of cooperative concern, one which requires running and methodic jealous (stinginess) by the corporate management.

Eventually, the final responsibilities should lie with the ship operators, and with the managers and ship staff that they employ. Actually, it is the crew and the seafarers who can make the most important contribution to introducing maritime safety and safety culture within the shipping industry.

2. THE MARITIME INDUSTRY AND SHIPPING COMPANIES

The shipping industry is one that economists prefer to think of as capital intensive due to the tremendous costs of the developed equipment used.

The provision of skilled and experienced personnel for the maritime context to cope with the growing requirements of the global industry has been the most difficult and imposing matter that owners encounter in every shipping center.

It has been observed in the field of the shipping industry that the technical innovation develops very quickly. The principle of the shipping industry is to develop the quality of seafarers in order to face the future demands of the shipping industry and maritime safety.

In fact, the progress of the shipping industry and the related issues has been affected by the improvement of MET; marine officers have been trying to accommodate the developments in industry demands.

The maritime industry is truly a global market. All shipping companies employ people coming from many countries with different backgrounds in MET and various cultures, which will generally affect safety culture.

There are IMO instruments with clearly marked obligations for shipping companies and shipowners (ISM & STCW are meaningful).

The shipping industry has to reach out to every sector of the community if it is to attract the best people to purse a maritime career.

The companies must employ the right people onboard and in the office and make sure that all of them know what their duties are, receive instructions on how to carry out their duties and get trained when and if necessary.

Experience from within the shipping industry has shown that a company may make use of any development in safety awareness and safety management skills of personnel.

3. THE HUMAN ELEMENT IN THE SHIPPING INDUSTRY

The principal factor of maritime safety is the human element and the term "human element" is normally associated with those at the lower end of the shipping hierarchy- the crew members, port operators and so on; it should be extended to cover every one involved and it should be professed that shipping safety is not as good as it should be because of manners at the top rather than in efficiency at the bottom.

Focus on the human element should be the primary prevention measure. Nationally and internationally, flag states should emphasize the human element in implementing the ISM Code and the revised STCW95.

It has been declared that the overwhelming majority of accidents at sea is caused by the so-called "human element" of ship operation, whether as a consequence of bad seafaring or poor management ashore. It has become clear that the human element, including the individual, the organization and total system, has to be taken into account in improving safety of ship operation.

The crew remains the most vital element to the safe and efficient operation of any ship despite the advancement of technology. They are also in focus when it comes to training and updating, certification and watchkeeping as well as safety culture.

Because we frequently take this factor, we tend to attribute accidents to the errors of the individual responsible for the operation of the ship. It is however a reality that the majority of the accidents are caused by an unfortunate integration of human and organizational errors.

The main fact is that the act of a human element plays some part in substantially every accident, involving those where construction or equipment failure may be the immediate cause.

Human error, a complex matter, may include inadvertence; equivocal; pilot-master relationships; low or indigent physical fitness; low eyesight; immoderate fatigue; immoderate alcohol use; immoderate personnel turnover; high level of estimated risk; improper lights and marks; misuse of radar; uncertain use of sound signals; inadequacies of the rules of the road, etc.

Human error can be classified into 3 major categories with the same approximation of the STCW Code 95 amendments. The 1st category is operational, i.e., based on human error. The 2nd category is management of human error and the 3rd category is the combination of the first and the second, which might cause a considerable accident or disaster by triggering chain events.

We know that there is scarcely a technical solution that the human element is unable to evade, ignore, fail to maintain, or break. The risks associated with human error will continue with the resulting loss of life, injury and pollution. The economic losses assignable to human factors have been shown to be significant.

A USCG analysis of human error falls into five categories as follows:

- – Management: Faulty legislation and standard inadequate communications and coordination.
- – Operator status: Inattention and fatigue.
- – Working Environment: Poor equipment design and hazardous natural environment.
- – Knowledge: Inadequate general technical knowledge and inadequate knowledge of ship board operation.
- – Decision making: Poor judgment and inadequate information.

4. INTERNATIONAL SAFETY MANAGEMENT (ISM) CODE

It is generally recognizing that the ISM Code is a key instrument that fortifies and enhances safety culture within shipping industry.

The ISM Code is basically concerned with system errors as regards the organization and the individual. Recognizing that people subsist the inherent element in the management of safety, it could give rise to an important change of culture in the industry. The philosophy behind the code is to eliminate as far as possible confusions about responsibilities, the flow of information and communication, and to set clear procedures for action in case of an emergency.

The essence of the ISM Code can be summarized in two statements: "the cornerstone of a perfect Safety Management System (SMS) is the obligation from the top" and that "in matters of safety and pollution prevention it is the obligation, competence, attitudes and motivation of individuals at the levels that determine the end conclusion".

Given the fact that an estimated 65 – 80 % of marine casualties are caused by human error, improvement in communication and training among ship personnel is needed. The ISM Code, with its global standards focuses owners' attention on planning and training measures to avoid problems before they happen and mitigate the damage when things go wrong. The code states that not only must procedures and measure be in place to support safety and prevent accidents, but there must be a full commitment to these measures by top level management.

The ISM Code states that its purpose is to provide an international standard for the safe management and operation of ships and for pollution prevention. The ISM Code triangle is as follows:

- – Top management: The objectives of the code are to ensure safety at sea, prevent human injury or loss of life, and avoid damage to the environment, in particular to the marine environment, and to property.
- – Shore personnel: Safety management objective of the company should, *inter alia*:
  - provide for safe practices in ship operation and a safe working environment;
  - establish safeguards against all identified risks; and
  - continuously improve safety management skills of personnel ashore and aboard ships, including preparing for emergencies related both to safety and environmental protection.
- – Ship personnel: The ISM Code requires that SMS should ensure:

1) compliance with mandatory roles and regulations;
2) that applicable codes, guidelines and standards recommended by the organization, administration, C.S and maritime industry organizations are taken into account. (ISM Code).

The ISM Code particularly addresses the company, which should ensure that the master is:

1. Properly qualified;
2. Fully cognizant with the company's safety management system;
3. Donated the de-rigueur support to achieve his duties safety.

The company is also responsible for ensuring that the ship is manned with qualified, certified and medically fit seafarers in accordance with national and international requirement.

Every person in the shipping company can benefit from the furtherance of safe practices in ship operation. Diminished damage, developed safety perception greater professionalism and developed moral are apt to bring authentic cost saving and better efficiency.

5. SAFETY MANAGEMENT SYSTEM (SMS)

The SMS is the cornerstone of the ISM Code. It needs safety and environmental protection policy, determined levels of authority, clear lines of communication between shipboard and shore-side personnel, and contingency propensity and accession procedures. The code animates the regular improvement of safety management skills in the shipping industry and provides a link among the company and the seafarers onboard its ships.

The ISM Code establishes safety management objectives which are:

– To provide for safe practices in ship operation and a safe working environment;
– To establish safeguards against all identified risks;
– To continuously improve safety-management skills of personnel, including preparing for emergencies.

The SMS consecutively should include a number of operative requirements:

– A safety and environmental protection policy;
– Instructions and procedures to ensure safety and environmental protection.

Defined levels of authority and lines of communication between and amongst shore and ship born personnel:

– Procedures for reporting accidents, etc;
– Procedure for responding to emergencies;
– Procedure for internal audits and management review.

A SMS is improved and conserved by people (human element). It is important to check the responsibilities and function (authority) of the different persons (human element) embodied in the system, and the lines of communication between persons influenced by it. Once assigned and documented, the tasks and activities related to the safety and environmental protection, both ashore and onboard ships, are the infrastructure of a SMS.

Safety Management System (SMS) requires a company to document its management measures to assert those conditions, activities and tasks, both ashore and onboard ships, affecting safety and environmental protection, are controlled, achieved and checked in conformity with legislative and company demands.

A structured safety management system empowers a company to focus on the cementation of safe practices in ship operations and contingency readiness and preparation.

The commitment and involvement of high level management and the demand to involve representatives from personnel on board and ashore have been recognized as key factors in the establishment and implementation of a SMS.

Hopefully, ship-owners and operators should see continuously the benefits of the SMS and commit to the ISM Code early, improving their implementation process. If adequately administrated, the SMS will enhance safety at sea, minimize the incidence of human injuries, limit unscheduled vessel delay, and reduce environmental results assignable to marine casualties.

Finally, safety management system (SMS) can become an attitude when it is harmonious and founded on the cultural tradition of its setting.

6. MARITIME EDUCATION AND TRAINING (MET)

Maritime education can be known as a series of interdependent operations such as teaching, learning, researching and using resources, including human element material and information than perform harmoniously to carry out appointed educational objectives.

In the 21st century, we are observe some dramatic changes in the proficiency and know-how needed by seafarers: advanced computer competence, and a considerable interdepartmental flexibility.

Training is one of the significant fields in day-to-day shipping operations and business. It is also closely related to the career improvement of seafarers. Training facilitation is thus likely to have an effect on the obligation of the seafarers' competitiveness and performance of the value chain.

Training and furtherance is the primal expedient in preparing the human resources for the group climate of developed organization.

One of the most important of IMO's technical cooperation objectives is to support developing countries' human capital through training, education and other means of knowledge transfer.

IMO has emphasized the importance of high crew standards and adopted recommendations calling upon governments to ensure that the MET of master, officers, and seamen is kept up-to-date and in line with modern technological developments in this field.

It is generally agreed that the revised STCW will in the long run result in seafarers being better trained, in their certification becoming more reliable and in watch keeping procedures being improved. But will these improvements be sufficient to cut down the accidents rate? Will they do so in time? And what else should be done.

Improved training and crew standards are at the core of the STCW Convention.

The significant task of those supplying the training should be highlighted. Trainers should be highly qualified, and stimulated and provided with a proper work environment and suitable compensation.

Accordingly, crew training must be developed and the standards of the individuals involved in shipping, onshore as well as sea, should be improved.

Maritime training institutes should do all they can to ensure that their students adopt the concept of safety culture.

The world Maritime University in Malmo, Sweden, as a center of excellence for maritime education and training should develop the highest practicable standards in all maritime affairs and provide a mechanism for international exchange and transfer of knowledge and application.

Maritime institutes involved in MET business have a responsibility to hand over efficacy courses that meet the individual and the shipping industry's needs. The organizational authorities have a burden to ensure that this is so. But how do we ensure that this is so worldwide? It is a role for some international or global body such as IAMU, IMO and WMU.

7. SEAFARERS

The shipping industry remains a stimulating, hiring and fulfilling vocation: a vocation that can employ people almost anywhere. Seafaring is not only a favorable and worthwhile vocation choice in itself, it is also a permit to a vast diversity of related jobs ashore for which experience at sea will make one notably qualified. Indeed, many dedicated professional seafarers are now managers, dispersed throughout the shipping industry, after serving their early years at sea.

There are many groups involved in improving safety at sea, including IMO itself , member governments, ship owners, insurers and C.S., but of all those involved, non has a greater interest than the seafarers because for if something goes wrong, they are the only ones who risk losing their lives.

The role of human element resources management is no longer only to assert that the seafarer posses the required skills and knowledge as well as to setup the environment in which staff can learn, contribute and perform.

Every management in a shipping company should have sea crew and shore staff able to treat the different aspects of the business of the company as individuals and, more significantly, as a team.

The seafarers as worthwhile human resources are not only directly inclusive in maritime industry because of their working on board, but also are making participations as ashore employers, which could be considerable for some shipping companies. With the implication of seafarers, the capability of the shipping company could be further scrutinized.

But more than that, it has been made clear that the seafarer is one of the most important elements in the shipping companies business. He should be competent but also be trained regularly with refresher courses to update his knowledge and preserve and develop his standard of competency which is the principal step for any safety programme. If we approve this notification, the ISM Code certification is more than just certificate of compliance; it is an intellect of best management practices for the entire human element in a company.

8. SAFETY CULTURE

To firm up the safety culture concept in the sea crew, to cultivate in individual seafarers the initiative to learn, to follow the procedures and to work safety, the development of safety culture is crucial. Safety culture is the cure for human error.

By concentrating on the human element generally, IMO is invigorating the link between management ashore and functioning afloat to enhance a safety culture.

The safety culture of an organization is the product of individual and group attitudes, perceptions, aptitudes, competences and qualifications. It is definite that a safety culture needs the functional cooperation between management and the workforce. Safer shipping needs a safety culture.

Where the ISM Code had been embraced as a positive step towards affection through a safety culture, substantial positive feasibility were manifest, and ISM Code conformity could be made easier through a lessening in the administrative process.

In its pursuit of a safety culture at sea, IMO focused attention on safety and the human factor in the maritime industry and developed the STCW convention.

Effective improvement of safety culture extends with obligations, values, and beliefs. Communication and demonstration of obligation, values and beliefs should start from management.

9. IMPLEMENTATION

The objective of ISM Code is to ensure compliance with all mandatory rules and regulations by addressing organizational structures, responsibilities and procedures. The will to implement these objectives affects safe operation and emergency preparedness. Successful implementation leads to the desired safety culture provided there is adequate commitment from the owner/operator!

A vital factor in the successful implementation of a SMS is the selection of the right personnel to fill positions influencing its performance.

Experience from transportation and shipping industries prove that the implementation of safety management System (SMS) avail business. Shipping companies focusing on safety management experience that they reduce casualties.

Worldwide regular implementation of SMS (Rules and Regulations) is of high importance. Developing enforcement by flag states and classification societies, and augmenting port state control will improve quality and safety in shipping industries.

Consideration of the "human element" by all players will lead eventually to more cost-effective solution with lasting influences.

Regular checks and audits should be held by the company to ensure that the SMS is being complied with and the system itself should be reviewed periodically.

Perceiving that too many shipping accidents as well as incidents are assignable to human factors, the full implementation of the revised STCW and the ISM Code are apparently significant. The national and international exertion should go some worthwhile way towards providing the level playing field that good ship owners wish to see and eliminate the inequitable competitive advantage currently enjoyed by the operators of substandard shipping.

10. CAUSE OF MARINE ACCIDENTS

Although the improvements in maritime safety are measurable and demonstrable, accidents still occur, and it should be clear that the cause why accidents continue to occur is because some people somewhere did not take the convenient initiative to avoid a problem, or did something wrong. So, lack of knowledge or inadequate application of the basic rules of the road are the major contributory factors in maritime accidents.

So, any earnest effort to improve maritime safety and prevent maritime pollution must concentrate on the elimination of human error because accidents do not happen but are caused, and most of them are caused by human element.

The question is why highly skilled and well-trained professional seafarers make mistakes. We should find an answer to this paradox. The main reasons for accidents may be boor judgment, complacency, disregard of basic seamanship and inexperience.

A list of the causes which affect how seafarers work and contribute to accidents includes alcohol abuse, inadequate technical knowledge or language skills, fatigue, low morals and injury, together with staffing levels, work environment and company management.

It is rare that a single item causes an accident or incident. Commonly overall chain of items and/or acts are embodied. The human part can go back to the design of the system or portion of equipment or ship, to the construction, to the effective fabricating process, to installations, etc.

The key factors effecting ship safety are the ship, the organization or ship company, human element, operations and the manner all of these factors are actuated. The majority of marine accidents are the result of a chain of happenings correlated to the ship, the organization and management or ship companies, and personnel and their qualifications.

11. THE CONVENTIONS RELATED TO THE HUMAN ELEMENT

The two measures that are at the hart of IMO's commitment to addressing the human element in shipping and awfully directly designed to affect the culture and process aboard ship and within shipping companies are:

First: The revised Convention on Standard of Training, Certification and Watch-keeping for seafarers (STCW).

Second: The International Safety Management Code.

The two conventions provide a set of practices and a safety system which will enhance its continued success for the future of shipping industry.

The core of the STCW convention depends on basic MET. The level of skill and proficiency needed to perform any given task comes first and foremost.

The same can be said of the ISM Code, although this deals with management structure and responsibilities. The ISM Code addresses the responsibilities of the people that are at the heart of IMO's commitment to addressing the human element in shipping.

With the adoption of the ISM Code and the International Convention on Standards of Training, Certification and Watch Keeping for Seafarers "STCW 78", as amended in 1995, IMO has highlighted the dominant role played by the human element and management in safety at sea and environment protection.

The essence of the ISM code is its distinct focus on the human element. In the vast majority of cases, accidents happen because somebody, somewhere along the line, did not take the proper action to avoid a problem or did something wrong, whether through laziness, ignorance, fatigue, negligence or stress.

So, two important statutory measures have been adopted: the ISM Code and STCW Convention.

The ISM Code requires operators to establish a defined Safety Management System (SMS) and acquire certifications to that effect.

The revised STCW Convention puts in place enhanced training and watch keeping requirements which will continuously lead to a more skilled and flexible labour force.

The revised convention will provide the framework to ensure that they are appropriately trained and possess the skills to do the job properly.

The Code outlines the responsibility and authority of the master of the ship. It states that the SMS should make it clear that the master has overriding authority and responsibility to make decisions. The code deals with other seagoing personnel and emphasizes the importance of training.

The revised STCW Convention has highlighted the importance of the qualification of shipboard personnel and the importance of MET for such personnel.

The revised STCW Convention is a very important instrument to deal with the influence of the human element and accidents.

What are the characteristics of the ISM Code and the revised STCW Convention? The key features of the STCW Convention are that it adopts that human element are of crucial significant in any institution, and that training and education are vital to improve the skills and competencies of the human element and, through that process, instill a safety culture in all fields of their business. The strength of the said convention is that it is founded on the improvement and demonstration of competence in all of the main safety-related areas of work on board. The ISM Code sustains the STCW perspective in setting assurance upon frequently developing the safety management skills of personnel ashore and afloat, and personnel being adequately qualified and certificated. The introduction of competence-based training and assessment has strengthened the steps towards a safety culture and has led to an important strengthening of conjunctions between the training suppliers and the shipping companies and their staff, all moving towards the objectives and standards explicating (disclosing) in the conventions.

The ISM certification prescribes vessel management and environmental policies, emergency response procedures, accidents and non-conformity reporting procedures and operation procedures and maintenance manuals.

The STCW certification focuses on "human factors" including verification that vessel watch standers have enough rest, basic language ability and basic safety training and that the crew is competent.

The challenge for ISM and STCW is to guarantee that the human element and safety and quality system programs become institutionalized as we go ahead.

12. CONCLUSION

Effective implementation of the STCW convention and the ISM Code through proper MET will promote seafarers and the practical safety of ships.

Safety at all times in the shipping industry requires continuous commitment of directors, managers, supervisors and all the people engaged in the company's activities.

Companies are required to establish and implement a policy for achieving these objectives, and every company is required to designate a person or persons ashore having direct access to the highest level of management.

Companies are required to prepare plans and instructions for key shipboard operations and to make preparations for dealing with any emergencies which might arise. The importance of maintenance is stressed and companies are required to ensure that regular inspections are held and corrective measures taken where necessary.

IAMU, as a non-governmental organization "NGO" in IMO should actively share in the issues such as maritime safety, environmental protection, maritime education and training and it can make structural suggestions and recommendations.

ACKNOWLEDGEMENTS

I would like to record my gratitude to the organizers of the AGA10 for giving me the chance to deliver my paper.

References

[1] Asyali, E., Yasar, O., Cerit, A., Cooperative Learning and Teamwork effectiveness: Impacts of Education Period on Cadet, IAMU Journal, Vol. 4, No. 2, March 2006, p. 9.

[2] Bajpaee, R., Ship management in the 21st Century- a Strategic review, BIMCO Review, 2000, p. 237.

[3] Bell, D., ISM Code Implementation and Its Link with the STCW 95 Convention, BIMCO Review, 1998, pp. 59 – 60

[4] Card, J., Combating Unsafe Ships, BIMCO Review, 1996, pp. 237 – 238.

[5] Chauvel, A., Managing Safety and Quality in Shipping, BIMCO Review, 1998, p. 91.

[6] Graveson, A., The Human Element- Success or Failure, IMLA Proceedings, 2000, pp. 46 – 48 – 49.

[7] Kim, G., Quality Issue in Shipping and Maritime Education, IAMU Proceedings, 2001, p. 97.

[8] Larking, S., ISM Code – Ship Compliance, D.N.V, 1995, pp. 1.

[9] Loginovsky, V., Safety Management-Leading Space Information Conception (LSIC), IAMU Proceedings, 2001, pp. 39.

[10] Mejia, M., Performance Criteria for the International Safety Management (ISM Code), IAMU Proceedings, 2001, p. 109.

[11] North, R., The Challenge before Us, BIMCO Review, 2000, p. 102.

[12] O' Neil, W., IMO-Safer Shipping Demands a Safety Culture, IMO News, issue 3, 2002, pp. 4 – 5 – 14 – 15.

[13] O' Neil, W., Committed People Working for Safe, Secure and Clean Seas, IMO News, issue 3, 2003, pp. 4 – 5.

[14] O' Neil, W., Raising World Standards in the Maritime Industry, IMO News, issue 2, 2003, pp. 4.

[15] Pattofatto, G., The IMO Safety Management Cod, BIMCO Review, 1994, pp. 30 – 31 – 32.

[16] Payer, H., The human Factor in Shipping Safety, BIMCO Review, 1996, pp. 145 – 146.

[17] Petersen, S., The Human Element, BIMCO Review, 1999, p. 66.

[18] Przybylowski, A., Identification of Internationally Accepted Standards of Environmental Management and Quality Assurance that should be Incorporated into Maritime Safety Management System, IAMU Proceedings, 2001, pp. 129 – 130.

[19] Salerno, U., Technical and Scientific Expertise Unites IMO and IACS, IMO News, issue 4, 2003, p. 33.

[20] Schiferli, R., Working towards ensuring ISM compliance, BIMCO, Review, 2000, p. 96.

[21] Squassafichi, N., RINA, The ISM Code and The Human Element, BIMCO Review, 1996, p. 147 – 149.

[22] Xian, Z., William A. O'Neil: An Appreciation, IMO News, issue 4, 2003, p. 14.

[23] Yangxing, J., The Exploration of High-Quality, Internationalized and Sustainable Maritime Education and Training, IAMU Proceedings, 2006, p. 80.

CREATIVITY FOR THE NEW MARITIME COMMUNITY: MARITIME TRAINING IN THE TWENTY-FIRST CENTURY

Bunny Paine-Clemes,
PhD, Cal State Maritime, USA
E-mail: bclemes@csum.edu

Abstract. Creativity is the knack of inventing something new and useful. It cannot be taught, but it can be fostered. No matter what our purview in education, we need creativity ourselves, and we need to nurture it in the students under our guidance and care. The importance of creativity has been noted by business author Daniel L. Pink and globalization expert Thomas L. Friedman, as well as surveys of US employers. While the creative process is normally divided into five stages – preparation, concentration, incubation, illumination, and verification – our focus here will be on techniques to aid in the three middle stages: how to invite the flow state and foster intuition (that "gut feeling" on which so many successful businessmen rely), how to invent by creating combinations ("Janus thinking"), and how to encourage group creativity by avoiding toxic structures and providing supportive ones. All of these techniques are taught in a creativity class at Cal State Maritime, USA.

THE IMPORTANCE OF CREATIVITY

Thomas L. Friedman [1] notes the importance of creativity in the new globalized world:

If Americans and Europeans want to benefit from the flattening of the world and the interconnecting of all the markets and knowledge centers, they will all have to run at least as fast as the fastest lion – and I suspect that lion will be China, and I suspect that will be pretty darn fast.

Friedman calls our new world "flat" because technology has connected us and eliminated many hierarchies. Multinational corporations are competing all over the world, but one entrepreneur with a computer and an idea can compete as well. Friedman says that since the demolition of the Berlin Wall on November 9, 1989, and the mid-nineties proliferation of the Windows PC, followed by the explosion of the World Wide Web, we are all in competition with one another, and the best ideas will win.

Because of this new "flat world," we will have to learn to use our human resources wisely. How can we all compete in the new global economy?

Peter D. Hart Research Associates [2] asked this question of US employers. In 2006 the firm interviewed 305 employers with a staff of at least 25 and conducted focus groups with executives in Milwaukee, Wisconsin; Fairfax, Virginia; and Atlanta, Georgia. Overwhelmingly, these employers said that they wanted to hire new workers who had the "soft skills" provided by a liberal education: among them, teamwork (76 %), oral and written communication skills (73 %), critical thinking and analytical skills (70 %), **the ability to be innovative and think creatively (70 %)**, and the ability to solve complex problems (64 %). In addition, employers felt that colleges did not place enough emphasis on these skills: teamwork (76 %), oral and written communication skills (73 %), critical thinking and analytical skills (73 %), **the ability to be innovative and think creatively (70 %)**, and the ability to solve complex problems (64 %) [Emphasis mine].

Here's what Daniel Pink [3] has to say about the thinking required in this new world and the need for Western culture to change its exclusively left-brained focus:

For nearly a century, Western society in general, and American society in particular, has been dominated by a form of thinking and an approach to life that is narrowly reductive and deeply analytical. . . . But that is changing. We are entering a new age. . . . [While] "left-brain" capabilities powered the Information Age. . . the capabilities we once thought of as frivolous – the "right-brain" qualities of inventiveness, empathy, joyfulness, and meaning –increasingly will determine who flourishes and who flounders.

Isaacson [4] says that in this new global economy, "A society's competitive advantage will come not from how well its schools teach the multiplication and periodic table, but from how well they stimulated imagination and creativity."

THE FIVE STAGES OF THE CREATIVE PROCESS

Though pundits have divided the creative process into as few as four or as many as seven stages, what follows is a common description.

Preparation. The creator becomes immersed in the formulas and rules of the craft. Often quoted [5] is Pasteur's dictum: "Chance favors the prepared mind." Weisberg's [6] often-cited "ten-year rule" is that a successful artist must practice the craft at least ten years before success.

Concentration. The creator becomes obsessed. According to Stross [7], Edison spent days in his lab without going home; and Isaacson [8] says that Einstein was the "icon" of the "absent-minded professor." On a journey, he sometimes forgot some of his clothes or even his suitcase.

Incubation. A problem interrupts the process. The creator takes a break, and unconscious processes work on the solution. Poincaré [9], a mathematician, said, "Often when one is working at a hard question, nothing good is accomplished at the first attack. Then one takes a rest, shorter or longer, and sets down anew to the work."

Illumination. The Eureka moment arrives. Poincaré called it "a manifestation of long, unconscious prior work." Nobel-prize-winner Barbara McClintock called it "integration." She claimed that although the solution came suddenly, it was not a lightning bolt of intuition but, in the words of her biographer Nathaniel Comfort [10], a sudden "synthesis of many bits of knowledge." Comfort believes that this sort of thinking is common in math and physics: "The most famous integrator of all was Albert Einstein." His Eureka moments came in pictures, such as when he conceived the relativity theory by imagining himself riding a beam of light. McClintock's illuminations came too fast for pictures.

Verification. Csikzentmihaly [11] stresses that the creator must test the work to identify its usefulness in the field: "all the individuals who act as gatekeepers." An engineer, according to Petroski [12], considers this phase crucial. Stross [13] relates that verification was a problem for Edison, creative in the realm of ideas yet unable to grasp the pragmatics of marketing. He insisted that his phonograph should be used for office dictation rather than for music. He took an adamant stand against movie projection systems in favor of kinetoscopes into which people stooped to stare. His friend Henry Ford called Edison "the world's greatest inventor and world's worst businessman."

INTUITION AS CONCENTRATION AND ILLUMINATION: ACCESSING THE "FLOW STATE"

After our students have prepared by learning the maritime "rules of the roa", the secrets of supply-chain management, or any other principles of their field, they are ready to concentrate and invite the flow of creative intuition.

Flow. The research of Mihaly Csikzentmihaly [14] has defined what characterizes this inspired state. He first asked subjects from all walks of life to wear a buzzer; then he buzzed them at random times to ask what they were doing and how they were feeling. He discovered that those involved in passive activities, such as television watching, were mildly depressed; but that those engaged in challenging tasks were the happiest. He named the state they were enjoying "Flow". During "flow" we are so involved in an activity that nothing else seems to matter; the experience itself is so enjoyable that we will do it even at great cost, for the sheer sake of doing it." Here are some of his thoughts about "flow":

– It creates happiness.
– It is achieved by focusing our attention on some task and staying in the present, without regard for future rewards. We have learned "to focus attention at will, to be oblivious to distractions, to concentrate for as long as it takes to achieve a goal, and not longer".
– The enjoyment created by "flow" occurs when
  - the task is likely to be completed;
  - we are concentrating;
  - the task "has clear goals and provides immediate feedback";
  - we are immersed in the task and removed from "the worries and frustrations of everyday life";
  - we have a sense of control;
  - "concern for the self disappears, yet paradoxically the sense of self emerges stronger" afterward;
  - "duration of time is altered".

During flow we have the sense of operating at the peak of our powers. Abraham Maslow [15] might say we are having a peak experience: a blissful, joyous moment in which we feel most alive. Creative people in all fields experience such moments as the heights of inspiration and intuition, a time when subject merges with object, the dancer becomes the dance, and problems dissolve into solutions.

So how can we access flow or encourage it in our students?

The Task. Set a task that is challenging, at the limit of the student's powers but not beyond. To discover how professors at Cal State Maritime create this situation in their simulator classes, see the section on Bridge Resource Management.

Replication. Ask them when they created flow before. If they can identify the conditions, such as being out at sea and pondering the vastness of waves and sky, they can create flow again, by imagining that situation and remembering how it felt.

Visualization. According to Hanks and Parry [16], the brain perceives visualization as action. They cite an experiment published in *Scientific Research Quarterly*:

– Students were divided into three groups.
– The first group practiced "basketball free throws every day for 20 days".
– The second group didn't practice.
– The third group practiced "mentally only".
– The first group "improved by 24 %".
– The second group "didn't improve at all".
– The third group "improved by 23 %".
– "The researchers concluded that practicing mentally is virtually as effective as actual physical practice."

Here is the explanation by Dr. John C. Eccles and Sir Charles Sherrington, experts in brain physiology: "When you learn anything, a pattern of neurons forming a chain is set up in your brain tissue. This chain, or electrical pattern, is your brain's method of remembering. So since the subconscious cannot distinguish a real from an imagined experience, perfect mental practice can change, or correct, imperfect electrical patterns grooved there". Robert and Michelle Root-Bernstein [17] note "significant correlations between the aptitude for visual imaging and career success in engineering" and "a statistically significant correlation between professional success and visual thinking among scientists as well as inventors".

A senior Marine transportation student at Cal Maritime [18] testifies to the value of this practice:

Based on the teachings and advice from our Creativity class, I am finding that a brief moment of meditation before a job really benefits me in my ability to execute the job. In my meditation, I am focusing on the givens or constants that come with the job. I visualize the ship at the dock. I mentally place myself behind the controls. I try to feel the tug vibrating as the propellers begin to cavitate as I am backing into the tug line. I imagine what commands the ship pilot will call out to me and I then mentally execute the commands. I try to predict the movement of the tug as my hands steer the powerful engines. I try to relax and try to maintain a level of intense concentration. My meditation usually last about ten minutes. In this time, I have run through an entire job. . . . I awake with a sense of accomplishment and I am now ready to take on the responsibilities of operating a ship assist tugboat.

Another cadet [19] also attests to visualization as powerful:Visualizing is one of the most important right brain methods for creativity and innovation. This helps me with many things such as exercising, tying knots, making plans, and studying. Any person working around dangerous equipment or in potentially harmful situations like we will in the industry can testify that it is important to visualize how the lines will react under strain, or how goggles will be important, or how will coworkers react to your methods of work.

Mindfulness. Encourage the students to practice mindfulness: to be fully in the present, in the here and now, paying close attention to the task at hand. Langer [20] says, "Mindlessness limits our control by preventing us from making intelligent choices." How many industrial catastrophes or maritime collisions have resulted from workers who were not aware, not concentrating – impaired by sleep loss, substance abuse, medication, or distraction? Famous examples include the *Titanic* and the *Exxon Valdez*. More recently, in 2007, the *Cosco Busan* collided with a pillar of the Golden Gate Bridge and spilled 53,000 gallons of oil into San Francisco Bay, an accident for which pilot John Cota was held largely responsible. According to Henry Lee [21], "The [investigative] board blasted the Coast Guard for not having revoked Cota's pilot's license despite his history of accidents, alcohol abuse, a sleep disorder and the use of medications known to impair judgment." By contrast, U.S. Captain Phillips used creativity and mindfulness when his ship was attacked by pirates off Somalia. First he surrendered himself to save his crew. Then watched and waited for three days. At last his guards became inattentive, and he dived into the sea. The pirates started shooting at him, so Phillips, still clear-headed and mindful, swam back to surrender again. Shortly thereafter, in another case of preparedness and mindfulness, U.S. Navy Seal sharpshooters took down three pirates with three shots. The story is narrated by Pittman and Jakes [22].

It is hard to be mindful all the time; Buddhist monks spend a lifetime attempting to learn how. But we can at least train our students, whether in a simulator or at sea, to keep their minds returning to the task, to be aware of other ships, weather conditions, instrument readings, and communications onboard. We can keep asking them to monitor where their minds are. With mindfulness they will be able to use their creativity and critical thinking should problems arise.

Questioning. The next step is to ask questions and await an intuitive response. Donald Walters [23] says, "Clarity begins with asking the right questions. It comes with knowing exactly what the problem is, and then, offering that problem up into the creative flow, in the full expectation of receiving a solution." If we are mindful, calm, and immersed in flow, the right answers may come. Nobel prize winners Watson and Crick [24] codified the exact structure of DNA after asking, "What are genes made of? How are they copied exactly? And how do they control, or at least influence, the synthesis of proteins?" According to Ray and Myers [25], the inventor of McDonald's asked, *"Where can I get a consistent hamburger on the road?"* Ray and Myers comment, "Implicitly or explicitly, creativity always begins with a question." And often, we should also look at more than one perspective.

JANUS THINKING AS CONCENTRATION AND ILLUMINATION

Albert Rothenberg [26] says creativity involves "Janus thinking": being able to look two ways at once, like Janus, the Roman god of the doorways. (See Fig. 1).

Isaacson [27] says Einstein had this "ability to hold two thoughts in his mind simultaneously, to be puzzled when they conflicted, and to marvel when he could smell an underlying unity."

Fig. 1: Janus, the Roman God of the Doorways

Janus Thinking. Various techniques help students practice this type of synthesis.

– Give examples of inventions that have been created from combinations. For example, von Oech [28] mentions that Gutenberg connected the pressure of the wine press and penetration of the coin punch to invent the printing press; Hanks and Parry [29] explain that Bill Bowerman looked at his wife's waffle iron one morning and decided to use its pattern on the bottom of an athletic shoe, thus creating the Nike.

– Have students create analogies. Robert and Michele Root-Bernstein [30] explain, "Many scientists rate analogizing as one of their most important mental skills". Especially useful are "analogies to nature". "Surgical staples" were inspired by the way primitive tribes closed wounds with biting ants. Velcro was inspired by burrs.

– Practice Edward deBono's [31] idea of random stimulation, which entails combining things that seem to have no connection or that come from different fields. For instance, try this exercise:

  - Provide ordinary objects chosen at random, such as a spoon, a rock, a corkscrew.
  - Have students think of a problem needing a creative answer, then select an object.
  - Ask students, how does this object suggest approaches to solving your problem? Free associate; let your mind go wild.
  - Tell them to jot down their ideas, then share with the class.

Because the mind wants to create patterns and make sense of things, the mind will generate an association or connection that may lead to an "aha".

– Have students combine insights from different fields of study. Roger von Oech [32] says, Every culture, industry, discipline, department, and organization has its own way of dealing with problems, its own metaphors, models, and methodologies. But often the best ideas come from cutting across disciplinary boundaries and looking into other fields for new ideas and questions. Many significant advances in art, business, technology, or science have come about through a cross-fertilization of ideas.

He explains: "An aerospace manager . . . took up the habit of designing and constructing backyard waterfalls for himself and his friends. 'I don't know why,' he said, 'but designing waterfalls has made me a better manager. It has brought me a lot closer in touch with ideas such as flow, movement, and vibration which are difficult to put into words, but which are important in the communication between two people".

Hanks and Parry [33] explain, "Since combination is often the essence of creative ideas, the walls we construct restrict the associations we can make. And we end up with fewer combinations".

On interdisciplinary connections, a senior MT student [34] at Cal Maritime had this to say:

> Interdisciplinary thinking is something new to the maritime industry. In years past, you were either deck side or an engineer. Before you could start your academy experience, you had to decide on

> whether you wanted to take the red pill or the blue pill. Your path would be narrow with few exits, much like a bowling alley with the inflatable bumpers installed. But times change and with them come paradigm shifts. The transportation industry has changed concurrently with the changes in technology and communications. The maritime industry is now more closely knit. The success of any one ship or company relies heavily on both ship and shore personnel.

Another cadet [35] identifies the three above three techniques – "Mindfulness, Visualization and combining unlike items" – as his most important tools in creativity.

TOXIC AND SUPPORTIVE SYSTEMS

Toxic Systems. Unfortunately, toxic structures that inhibit creativity abound in business, education, and government. In fact, the assumption of the Total Quality Movement (TQM) is that workers want to do their jobs well but are prevented from doing so by a dysfunctional system. I quote from an earlier article of mine [36] with an amusing example, "the bead game", as explained by Chaffee and Sher [37]:

A large bowl contains 1,600 white beads and 400 colored beads. Colored beads are defects. Employees are equipped with a paddle containing 50 bead-sized indentations. They scoop the paddle into the bowl, and it comes out containing 50 beads. The beads are hot, so workers cannot touch the beads or container.

The goal is to have no more than five defects for each immersion of the paddle. The flaw in the process soon becomes evident: the beads are scooped out randomly, and nothing the players do can make a difference. By sheer chance, some workers scoop out more than five flawed beads.

People who play the Bead Game soon recognize both its parallels with actual work situations – setting goals, trying hard, motivating, warning – and its hopelessness. Ultimately, the best and perhaps the only way to obtain lower defect rates is lowering the proportion of colored beads in the bowl. But the workers cannot lower the proportion, for they are dippers, not process designers, purchasers, or managers.

Hence, for TQM, "The primary job of administration is to remove the barriers that prevent people from achieving quality work processes".

One of these barriers is the ego-driven, truculent bully boss. He can poison a whole system by leaving in his wake dispirited, disempowered victims. Robert I. Sutton [38] claims that we can identify one by his or her "persistent pattern" of leaving "one 'target' after another feeling belittled, put down, humiliated, disrespected, oppressed, deenergized, and generally worse about themselves".

Bolman and Deal [39] categorize the assumptions of such a manager as Theory X, explained by Professor Douglas McGregor: "subordinates are passive and lazy, have little ambition, prefer to be led, and resist change." The creativity of employees shuts down in the face of a managerial stance devaluing their motives and contributions.

For example, say Bolman and Deal, morale and productivity were down in a factory where women painted dolls. Each woman took a doll from a tray, painted it, and put it on a passing hook. The women received an hourly rate, a group bonus, and a learning bonus. Although management expected little difficulty with the new system, production was disappointing and morale worse. Workers complained that the room was too hot and the hooks moved too fast.

Reluctantly, the foreman followed a consultant's advice and met face to face with the employees. After hearing the women's complaints, the foreman agreed to bring in fans.

Despite the expectations of the foreman and "industrial engineer who designed the new manufacturing process," morale improved significantly. Then "after several [more] meetings, the employees came up with a radical suggestion: let them control the belt's speed".

Now, this example of creativity is modest: scarcely the "Creativity with a capital C" of Tolstoy or Dostoevsky. Nevertheless, it is creativity. Workers were encouraged to "think outside the box," to devise suggestions undreamt of by management. And the one they devised worked splendidly. "The employees developed a complicated production schedule: start slow at the beginning of the day, increase the speed once they had warmed up, slow it down before lunch, and so on." The foreman had been dubious about this plan; the engineer had argued adamantly against it. Nevertheless, Results of this inadvertent experiment in participation were stunning. Morale skyrocketed. Production increased far beyond the engineer's most optimistic calculations. The women's bonuses escalated so much that they were earning more than many workers with significantly higher levels of skill and experience.

So guess what happened?

The women's production and high pay became a problem because higher-skilled workers in the rest of the plant protested. To restore harmony, management reverted to the engineer's earlier recommendation: a fixed speed for the belt. Production plunged morale plummeted, and most of the women quit.

Ironically, such organizations work to destroy the initiative and creativity of their workers and then complain about the unproductive, listless workforce they themselves have created – employees who are simply putting in a day's work to collect their paychecks because they are discouraged from reaching their potential.

In contrast, say Bolman and Deal, is Theory Y, Professor McGregor's notion that workers seek to satisfy inherent needs. McGregor draws on Abraham Maslow's famous hierarchy to stress that after biological and safety needs are met, human beings want to satisfy needs for belonging, esteem, and self-actualization. In other words, as human beings we are hard wired to make the most of our potential, to be all that we can be. Following are examples of such supportive systems.

Supportive System: Bridge Resource Management. If you have taught a simulator course, you will not be surprised by the next section. I, however, was surprised to learn that simulator training encourages flow and, hence, creative decision making.

In the ship simulator at Cal State Maritime, student teams operate a bridge simulator, a virtual reality machine with a wraparound view of a harbor. The professor's job is to create problems that require fast decision-making.

Professor Messer-Bookman [40] says that stress is the greatest catalyst for creative and critical thinking in simulator teams. "If there's no urgency to the situation, the groups don't seem to gel as fast". She says that she is willing to be "the enemy" to provide that stress. She'll tell one team member to simulate a heart attack. She'll send a note to the brightest, most outgoing member of the team to say, "The captain wants you in her quarters now". She may tell the smart student, "I want you to give very wrong information". In essence, she creates the conditions for flow – a challenge just at the limit of the students' abilities.

She also stresses the importance of team synergy in helping the students deal with sudden crises. Those outside the industry may think that the maritime world is all about following orders in a rigid chain of command, but Professor Messer-Bookman says that nothing could be further from the truth.

She explains that teaching teamwork in simulator entails "Bridge Resource Management, an internationally accepted practice required at the senior level of management." The concept comes from the US Navy, which originally used "hierarchical management": says Professor Messer-Bookman, "You wouldn't address the captain even if you had a hunch something was wrong".

The rigid hierarchy had had the effect of "chilling information": "maybe the cook has an acute sense of smell and smells land!" She cites a possibly apocryphal anecdote: "Everyone on the bridge had a gut feeling something was wrong" but had "no direct evidence". As a result the ship went aground. Hence a new concept became operative: "Sir, I recommend . . .". Anyone can say it.

As a result, since the 1980's, the organizational chart of the modern merchant ship is "not a pyramid but a circle". Everybody is on the bridge "so everybody is in the loop, on the same page". "Also you have a synergy developing; when a problem does evolve everybody's on the same page. It only works if everybody is at same level of situational awareness".

With "Bridge Team Management", she says, "Just because you're senior you're not the best necessarily to handle the problem". When a problem develops and the crew members on bridge call the captain, they don't just step back and relinquish responsibility. "The Captain [enters] into the circle, which accommodates an additional brain. Everybody is contributing information into the pot". The crew will know more about how the problem developed and may be able to provide crucial information. (See Fig. 2).

Bolman and Deal [41] would call this structure not a Circle but an All-Channel Network or Star. Everyone in the group has access to everyone else, and information can flow freely from any one person to any other. In a Circle, as they define it, information passes only from one person to the next and never jumps to another part of the curve.

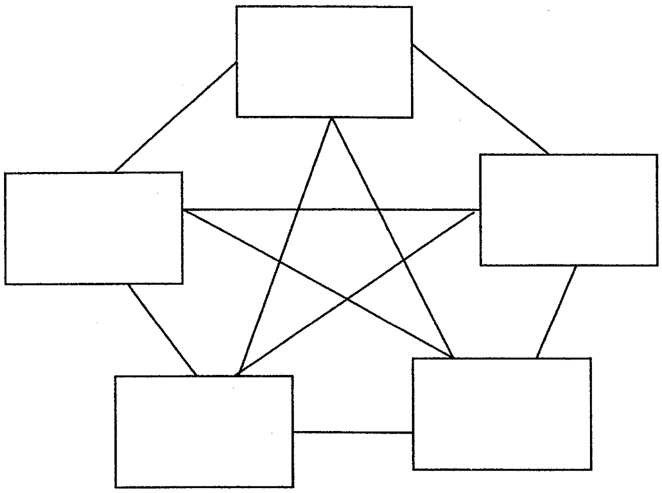


Fig. 2. All-Channel Network or Star

Professor Messer-Bookman trains her students that "Everybody must be cross checking everybody else". The motto is, "Trust but verify". What is optimum is "a circular flow of energy, almost like a magnetic field, [while] everybody's cross checking." Bolman and Deal say that in the Circle, as they conceive it, "the weakest link" can kill the information flow. In Professor Messer-Bookman's version of the All-Channel model, "The saying 'You are only as strong as your weakest link' is not true." Others will "take up the slack". "The four [members of the simulator team] working together are more effective than each working independently; [that] means we have a little room if one isn't as strong in an area".

One problem noted by Professor Peter Hayes [42], who also teaches the course, is that teams can exhibit "a lot of groupthink, where the team is swayed by one assertive personality". Professor Messer-Bookman says, "If we have a personality type that shuts someone down, we'll talk about that during the brief" (a post-mortem that follows the experiential session).

Personality types matter. Professor Jim Buckley [43], who also teaches the course, notes that an intelligent Asian female may defer to the males even if they have the wrong solution. Women tend to use creative problem-solving techniques that are based on talk, whereas the men plunge in to action, then act again to correct their mistakes. For example, in one scenario, "the ship was on a collision course with another vessel. The men automatically turned, which correctly avoided the situation. After they made the turn they realized that they were going toward a shoal, and that was a separate problem. They turned to miss the shoal, but then that put them in the shallows. They looked at what they were going to do with the shoal and they were headed toward the ship again. They then made a third decision, which was to slow down". This action-reaction pattern took seventeen minutes.

In contrast, the women spent time discussing their options and then took a single action: to slow down. "They looked at the big picture and they looked at all the options and they considered everything before they ultimately made a decision". At the seventeen-minute point they slowed down. "The men made two or three different decisions to get to the exact same place the women made in one". In this instance Professor Buckley was monitoring stress levels by "finger pulse and blood pressure". Understandably, the men's stress level went up when the women were in charge, and vice versa.

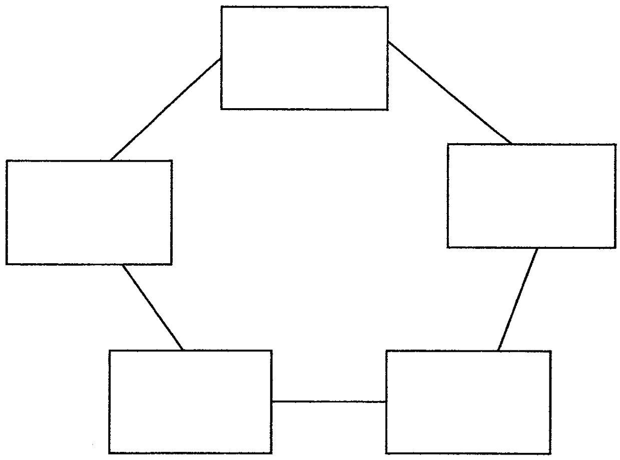


Fig. 3. Circle

The "ship-to-shoal" scenario demonstrates that with creative thinking, more than one solution may be possible. Hence the optimum group is one in which all channels in the "All-Star-Network" are operative. For simulator training Professor Bookman-Messer prefers a "random group", in which students are assigned to course sections, rather than a system of choice, which often puts high-performing friends in the same team together and leaves the weaker students to flounder by themselves. Diversity can also help to stop the "groupthink".

And does Bridge Resource Management work in the real maritime industry? Yes. The professor said she witnessed this system during a cargo transfer and was amazed at the collaborative synergy: "Licensed and unlicensed together, all discussed what was going to happen and who was responsible for what, everyone from deckhand to captain involved, [a system] unheard of 20 years ago".

Another supportive system: "The Best Damn Ship in the Navy". That's what Captain D. Michael Abrashoff [44] called the *USS Benfold* under his command. Abrashoff knew that it was his job to get out of his crew's way and encourage their creativity and autonomy. He says, "It's funny how often the problem is you".

Often, he claims, leaders operate out of their own "fears, ego needs, and unproductive habits". However, "My experience has shown that helping people reach their full potential can lead to attaining goals that would be impossible to reach under command-and-control". The title of his book, a "watchword" he often repeated to the crew, gave them ownership of their workplace: *It's your Ship.*

He endorsed fun and play, such as allowing the crew to rig a giant outdoor theater on deck. He also espoused the philosophy attributed to Cosimo de Medici by James M.Saslow [45]: "One of the things that Cosimo understood is that you get better work out of people when people are happy".

Abrashoff also invited ideas: "I began with the idea that there is always a better way to do things, and that, contrary to tradition, the crew's insights might be more profound than even the captain's. . . I asked everyone, 'Is there a better way to do what you do?' Time after time, the answer was yes, and many of the answers were revelations to me".

The *Benfold* system paid off. Here are a few of the results.

First, the crew and ship kept winning all manner of awards. In all naval contests, "Time after time, *Benfold* outperformed *Lake Champlain*", a ship with which it had "a strong case of sibling rivalry". Abrashoff gloats, "Actually, I didn't consider it rivalry; I didn't have any rivals. I was in competition only with myself, to have the best ship we possibly could".

A Theory Y manager, he encouraged self-actualization.

He arranged for his crew to take college entrance exams and "college courses via CD-ROM". He says, To my surprise, it spurred my sailors to keep taking other tests – Navy advancement tests – and *Benfold* soon had a promotion rate two and a half times the Navy average. By upgrading their skills, the crew accomplished all sorts of things. We challenged their minds, which made shipboard life more fun. They boosted their chances of getting good jobs in the civilian economy, removing the specter of flipping burgers from their futures. And they clearly enriched the ship's skills pool, which in turn improved readiness.

He adds, for my mid-level managers, my officers and chief petty officers, I set up clear and concise guidelines as to what I expected from them. I told them that I expected them to be experts in their own fields and that I would check on whether or not they were. Furthermore, they were expected to take on a project or two that would improve the ship's quality of life, or a military process that affected the entire organization. . . If you want to climb the ladder, you have to do more than your own specific job; you have to do things that affect the lives of others in the organization.

He then says, in language reminiscent of Bridge Resource Management, History records countless incidents in which ship captains or organization managers permitted a climate of intimidation to pervade the workplace, silencing the subordinates whose warnings could have prevented disaster. Even when the reluctance to speak up stems from admiration for the commanding officer's skill and experience, a climate to question decisions must be created in order to foster cross-checking.

He urges, "Make your people feel they can speak freely, no matter what they want to say". Sample phrases are as follows: "Captain, have you thought of this?" or "Captain, I'm worried about something", or even "Captain, I think you're dead wrong, and here's why. Yes-people are a cancer in any organization, and dangerous to boot".

He sums up his management style:

I worked hard to create a climate that encouraged quixotic pursuits and celebrated the freedom to fail. I never once reprimanded a sailor for attempting to solve a problem or reach a goal. I wanted my people to feel empowered, so they could think autonomously.

He also pushed the envelope on navy procedure more than once.

A higher-up in the US Navy (who wishes to remain anonymous) says that Abrashoff often defied the rules of the system and adds, "I'm glad I didn't have to relieve him".

"Idea Spaces" and Open Systems. Why did the VHS format conquer the superior Betamax? Why do we have video recorders, televisions, and airplanes? According to Keith Sawyer [46], the reason is the same. All of these successful innovations arose from shared ideas.

Sawyer remarks, "The key to understanding innovation is to realize that *collaborative webs are more important than creative people*". Sony introduced the first video recorder, the Betamax, in 1975; but rival JVC "made a key strategic decision in 1976: They would openly share their technology with companies and allow a collaborative web to emerge". Television arose from a "collaborative web" "extending back for decades". Though unveiled by RCA at the 1939 World's Fair, it began as an idea in 1872. The Wright Brothers may have gotten their plane off the ground, but it didn't fly far. The idea of ailerons came from a collaborative web established by Glen Curtiss while the Wrights themselves were busy filing patent infringement suits.

Sawyer's thesis is that companies thrive when they encourage collaborative webs. Richard Ogle [47] discusses "idea spaces": spaces where ideas can be shared between people:

The mind – seat and organ of human intelligence – is broader and deeper than we thought. It extends far out into the world, more outside than inside. Even without our being aware of it, this extended mind engages closely with our individual mind, shaping and organizing our thinking.

CONCLUSION: THE MOST IMPORTANT COMPONENT OF CREATIVITY: MAKE THE DECISION

Robert Sternberg [48] claims that "the key attribute" of "creative people" is that they make a "decision to be creative". They have the courage, inspiration, and know how to create something new and useful and they do, whether it is an invention, an organizational structure, or a class.

Consequently, the best way to be creative yourself and nurture creativity in your students is to "make the decision" to practice creativity and reward it. Students who are prepared with a knowledge of the creative stages, a practice of techniques like mindfulness and Janus-thinking, and an awareness of toxic and supportive structures are well placed to be creative themselves and encourage creativity in those they supervise. Then they'll know what to do when they see the pirate ship speeding toward them in the Gulf of Aden.

ACKNOWLEDGEMENTS

The material in this paper is drawn from *Creative Synergy*, a book-length manuscript by the author, and from a creativity class taught at Cal Maritime. The author wishes to thank those who have helped her frame her ideas: the many enthusiastic students from her classes in 2008 and 2009 and her Marine Transportation colleagues: Tuuli Messer-Bookman, Peter Hayes, and Jim Buckley.

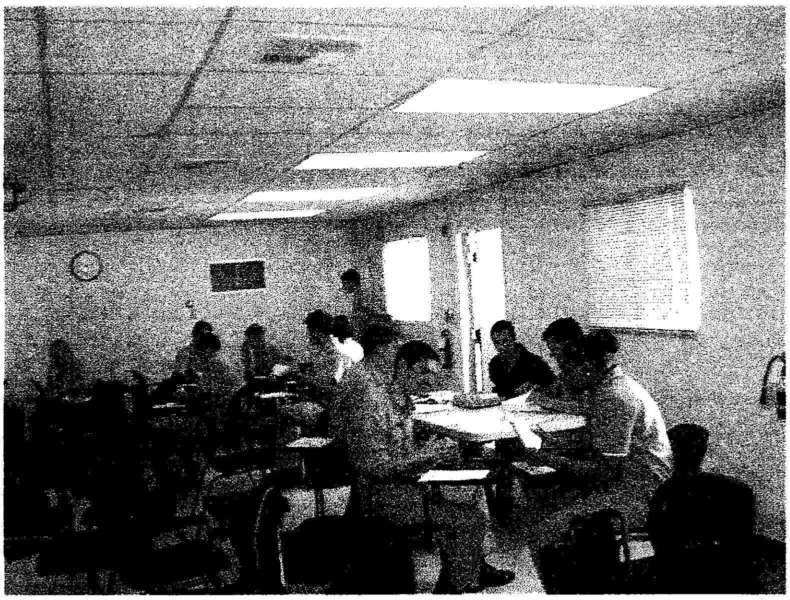


Fig. 4. Students in Creativity Class, Spring, 2009

References

[1] Friedman, T.L. *The World is Flat: A Brief History of the Twenty-First Century.* (updated and expanded ed.) NY: Farrar, Straus, and Giroux, 2006, p. 150. (Original edition published 2005).

[2] Hart, P.D., Research Associates. "How Should Colleges Prepare Students to Succeed in Today's Global Economy? Based on Surveys among Employers and Recent College Graduates. Conducted on behalf of the Association of American Colleges and Universities". (2006, December 28.) Retrieved April 29, 2007, from www.aacu.org/advocacy/leapdocuments/Re8097abcombined.pdf.

[3] Pink, D. H. *A Whole New Mind: Moving from the Information Age to the Conceptual Age.* NY: Riverhead Books/Penguin, 2005, pp. 2 – 3.

[4] Isaacson, W. *Einstein: His Life and Universe.* New York: Simon and Schuster, 2007, pp. 6 – 7.

[5] "Louis Pasteur Quotes". Retrieved May 7, 2009, from http://thinkexist.com/quotes/louis_pasteur/.

[6] Weisberg, R.W. "Creativity and Knowledge: A Challenge to Theories". In R. J. Sternberg (Ed.), *Handbook of Creativity.* Cambridge, MA: University Press, 1999, pp. 226 – 250.

[7] Stross, R. *The Wizard of Menlo Park: How Thomas Alva Edison Invented the Modern World.* New York: Crown, 2007, p. 66.

[8] Isaacson, W. *Einstein: His Life and Universe.* New York: Simon and Schuster, 2007, p. 39.

[9] Poincaré, Henri. "Mathematic Creation" (1933). In Brewster Ghiselin (Ed.), *The Creative Process.* Mentor Books. New York: New American Library, 1952, p. 38. (Originally published by the University of California).

[10] Comfort, N.C. *The Tangled Field: Barbara McClintock's Search for the Patterns of Genetic Control.* Cambridge, MA: Harvard University Press, 2003, pp. 68, 67. (Original work published 2001).

[11] Csikzentmihalyi, M. *Creativity: Flow and the Psychology of Discovery and Invention.* New York: HarperCollins, 1996, pp. 35 – 27, 38.

[12] Petroski, H. (1996.) *Invention by Design: How Engineers Get from Thought to Thing.* Cambridge, MA: Harvard University Press, 1996, p. 29.

[13] Stross, R. *The Wizard of Menlo Park: How Thomas Alva Edison Invented the Modern World.* New York: Crown, 2007, pp. 194, 199, 181, 197 – 198, 253.

[14] Csikzentmihalyi, M. *Creativity: Flow and the Psychology of Discovery and Invention.* New York: HarperCollins, 1996, pp. 110-113; *Flow: The Psychology of Optimal Experience.* NY: Harper and Row, 1990, pp. 29 – 33.

[15] Maslow, A.H. (1971.) *The Farther Reaches of Human Nature.* NY: Viking, 1971, pp. 174 – 175.

[16] Hanks, K., and Parry, J.A. (1983.) *Wake up your creative genius.* Los Altos, CA: William Kaufman, 1983, pp. 43 – 44.

[17] Root-Bernstein, R. & M. *Sparks of genius: The 13 Thinking Tools of the World's Most Creative People.* Boston: Houghton Mifflin, 1999, pp. 51, 53.

[18] "Senior Cadet", blog post on Creativity: Theory and Practice, February 9, 2009. Retrieved May 13, 2009, from http://bclemes.wordpress.com/ 2008/01/31/right-brain-knowing/.

[19] Sam Rouse, blog post on Creativity: Theory and Practice, April 28, 2009. Retrieved May 13, 2009, from http://bclemes.wordpress.com/ 2008/01/31/right-brain-knowing/.

[20] Langer, E.J. *Mindfulness.* Reading, Mass: Addison-Wesley, 1989, p. 51.

[21] Lee, H. "Coast Guard Faulted in Cosco Busan Spill". Thursday, May 7, 2009. Retrieved May 7, 2009, from www.sfgate.com.

[22] Pittman, T., and Jakes, L. "Daring Rescue of Captain Leaves 3 Pirates Dead". Retrieved May 7, 2009, from www.sfgate.com

[23] Walters, J.D. *Art as a Hidden Message: A Guide to Self-Realization*. Nevada City, CA: Crystal Clarity, 1997, p. 108.

[24] Crick, F. (1988.) *What Mad Pursuit: A Personal View of Scientific Discovery.* Alfred P. Sloane Foundation Series. N.P.: Harpercollins, Basic Books, 1988, p. 33.

[25] Ray, M., and Myers, M. 6.) *Creativity in Business: Based on the Famed Stanford University Course that has Revolutionized the Art of Success.* NY: Doubleday, 1986, pp. 93, 91.

[26] Rothenberg, A. The Process of Janusian thinking in Creativity. *Archives of General Psychiatry, 24,* 1971, pp. 195 – 205.

[27] Isaacson, W. *Einstein: His Life and Universe*. New York: Simon and Schuster, 2007, p. 15.

[28] Von Oech, R. *A Whack on the Side of the Head: How to Unlock your Mind for Innovation.* New York: Warner, 1983, pp. 6 – 7.

[29] Hanks, K., and Parry, J.A. *Wake up your creative genius.* Los Altos, CA: William Kaufman, 1983, pp. 7 – 8.

[30] Root-Bernstein, R. and M. *Sparks of Genius: The 13 Thinking Tools of the World's Most Creative People.* Boston: Houghton Mifflin, 1999, pp.145 – 146.

[31] DeBono, E. *Lateral Thinking.* Boston: Little, Brown, 1973, p. 204.

[32] Von Oech, R. *A Whack on the Side of the Head: How to Unlock your Mind for Innovation.* New York: Warner, 1983, pp. 106 – 107.

[33] Hanks, K., and Parry, J.A. Wake up your creative genius. Los Altos, CA: William Kaufman, 1983, p. 36.

[34] "Senior Cadet," blog post on Creativity: Theory and Practice, February 3, 2009. Retrieved May 13, 2009, from http://bclemes.wordpress.com /2009/02/03/21/.

[35] Ben Gomez, blog post on Creativity: Theory and Practice, March 18, 2009. Retrieved May 13, 2009, from http://bclemes.wordpress.com/2008/01/31/right-brain-knowing/.

[36] Paine-Clemes, B. What is Quality in a Maritime Education?" Paper presented October 25, 2005, in Malmő, Sweden, and published in *Maritime Security and MET: Proceedings of the International Association of Maritime Universities: IAMU 6th General Assembly and Conference, World Maritime University, Malmo, Sweden, 24 - 26 October, 2005*. Ed. Detlef Nielsen. Southampton, U.K: WIT Press, 2005. 267-76. Rpt. in *The IAMU Journal 2* iv (March 2006), pp. 23 – 30.

[37] Chaffee, E.E., & Sherr, A.A., (eds). *Quality: Transforming Secondary Education*, Report Three, 1992 ASHE-ERIC Higher Education Series, ERIC Clearinghouse on Higher Education: Washington, D.C., 1992. pp. 59 – 61.

[38] Sutton, R.I. *The No Asshole Rule: Building a Civilized Workplace and Surviving One that Isn't.* New York: Warner Business Books, 2007, p. 11.

[39] Bolman, L.G., & Deal, T.E. *Reframing Organizations: Artistry, Choice, and Leadership.* 3rd ed. San Francisco: Jossey-Bass, 2003, pp. 118, 145, 118 – 119.

[40] Messer-Bookman, T. Personal interview, February 15, 2007.

[41] Bolman, L.G., & Deal, T.E. *Reframing Organizations: Artistry, Choice, and Leadership.* 3rd ed. San Francisco: Jossey-Bass, 2003, p. 101.

[42] Hayes, P. Personal interview, February 15, 2007.

[43] Buckley, J. Personal interview, March 20, 2007.

[44] Abrashoff, Captain D. Michael. *It's your Ship: Management Techniques from the Best Damn Ship in the Navy.* Warner Books. NY: Time Warner, 2002, pp. 33, 4 – 5, 15, 123, 160, 163, 92, 89, 94.

[45] Quoted in *The Medici: Godfathers of the Renaissance*. Two parts. PBS documentary, 2006. Part 1.

[46] Sawyer, K. *Group Genius: The Creative Power of Collaboration*. New York: Basic Books, 2007, pp. 188-189, 184, 190 – 191.

[47] Ogle, R. *Smart World: Breakthrough Creativity and the New Science of Ideas.* Boston: Harvard Business School Press, 2007, p. 13.

[48] Sternberg, R.J. "Creativity as a Decision". *American Psychologist 57.5*, May 2002, p. 376.

THE METHODOLOGICAL PRINCIPLES OF THE DECK OFFICERS TRAINING AND MANAGEMENT OF THE TRAINING PROCESS

Dmytro S. Zhukov,
Capt., Senior Lecturer
Mykhaylo V. Miyusov,
Prof. Dr., ONMA Rector
Odesa National Maritime Academy (ONMA)
E-mail: d_zhukov@mail.ru rector@ma.odessa.ua

Abstract. The navigator – the operator represents the most difficult dynamic system. The feedback control in this system is carried out on the basis of the information processing. This system consists of set of the subsystems which coordination for concrete activity prior to the beginning of training is expressed poorly. From the beginning of this process there is a streamlining of communications which originally were in the relative disorder, therefore trained (or skilled) navigators more correctly and with a smaller expense of energy carry out the functional duties. It is known that the quantity of the information which have been saved up in a control system as a result of its information interaction with environment, defines the level of the organization of the given system. In relation to the navigator it means that the information received him during training joins to already save up and influences on his future actions. Navigational simulators played and continue to play a special role on the deck officers training. Efficiency of application of the simulator in a greater degree depends on accurately formulated goals and the training implementation, definition of objectives and programs of trainings, application of the modern techniques developed with the account psycho-pedagogical principles of training, and also use of an effective quality monitoring and estimation of activity of navigators during the education and training. Research of these aspects of the navigational simulator training is the purpose of given articles.

1. THE TRAINING GOALS AND OBJECTIVES

In the most general case the main objective of training is to provide the required professional standards: so that the level of the training should be in compliance with the following:

- It should be adequate to the requirements of the system as a whole;
- It should be defined either quantitatively or by means of exports.

In the determination of the training purposes the initial knowledge and skills of the trainees should be considered, and they are to be informed concerning this which is a necessary condition of the active relation of the trainee to the material.

Thus, an ultimate goal of simulator training of navigation is the mastering the professional knowledge, skills and the abilities providing a reliable qualitative and effective navigation in the constrained condition.

The training course content should be based under problems corresponding to the basic components of the navigating activity while sailing in constrained waters. The problems should be in compliance with the requirements of the international documents, in particular, to the International Convention on Standards of Training, Certification and Watchkeeping 78/95.

However the training process content is determined not only due to the content of ship navigating activity. It should be in compliance with the pedagogical principles: accessibility, gradualness, sequence, a systematic character of training, maintenance of unity of training and education; construction of educational process on the bases of conscious and active participation of trainees; the account of specific features of those trained; monitoring and estimation of durability of mastering the material. This principles are realized on the bases of the account of psychological laws of attention, perception, memory, imagination and thinking.

Training of navigators requires inclusion in the training process of the questions which would form not only knowledge of the process of ship navigating but also influence of these processes of the "human factor". Besides, training of navigators should include both the moods of operation in normal conditions and also in critical extreme situations.

2. BASIS OF TRAINING TECHNIQUE

Under training methods we understand the ways of realization of educational activity with navigators and ways of management of this activity carried out by instructors.

The methods concertised according to problems, the content, means and conditions of training are called techniques of training which should provide:

– Necessary level of motivation;
– Basic distribution of a complex of problems in time;
– The maintenance of conditions;
– For positive carrying over of skills;
– Conditions of intelligent mastering of presented material;
– Timely giving of the information to the trainee about quality of his work.

The basic methods of training of a navigator on a simulator are: lectures which help the trainees to assimilate the information which is subject to mastering, including the information of the problem, the purpose, the content and the way of performance; teaching material demonstration exercise, i.e. independent repetition of an educational problem on the operated model of the vessel. Generally specified the three methods are used in the course of training in this or that combination. The explanation can be accompanied with the visual demonstration; the demonstration can precede or accompany the explanation; exercise can be combined with additional explanation.

Connection of the methodical side of training with problems, the content and the training program is understood by the following. Tactically the choice of problems and the content of education action, determination of their sequence and the training program as the whole already to a certain extent determines the precondition for the choice of methods of training. Their final choice and the further concretization is carried out according to the character of the existing or practically available means of training psycho-pedagogical principles and the practical experience of their use, the required and initial level of competence of navigators and qualification of the instructors.

The basis of the process of formation of skills of regular repetition of educational problems which differs from simple repetition in the following:

– Aspiration of the navigator to raise quality of carried out activity;
– Self-checking of the navigator and the use of the results achieved at the previous stages;
– Increase of complexity depending on results of mustering the material;
– Exercise distribution in time.

It is necessary to note that even in the presence of perfect programs techniques and the tutorials the necessary level of training is not achieved if the instructors do not possess corresponding special both pedagogical qualification and necessary pedagogical qualities. Therefore the personality of the instructor is the key figure of the training center.

3. THE BASIC REQUIREMENTS AND INDICATORS OF ACCURACY OF NAVIGATION IN CONGESTIVE WATERS

For sailing in congestive waters the basic solution is the visual – comparative or the pilot method of navigation which consists in conducting of a vessel by means of the continuous monitoring of the sizes of linear and angular evasion from the route. This information possessed by the navigator becomes the managing one, however because of a considerable inertness of a heavy- tonnage vessel, to operating actions occurs with a big time delay. Presence of external casual disturbances, absence of methods of the exact forecast of movement of a vessel under the influence of operating actions creates a mismatch of actual and required trajectories. This mismatch is found out by means of the navigating equipment providing conductive of a vessel and by the received estimation navigator chooses the correct maneuver. Thus, a vessel, moving on the set mood makes fluctuation concerning it, and oscillative motion parameters depend of the navigation error.

The navigation error should be divided into two components – the error of navigation and the management error. When sailing in congestive waters navigation errors basically are determined by tool and the methodical errors of the systems providing navigation. Management errors are principal in size and are determined by external disturbances, dynamic characteristics of the vessel and characteristics of the navigator as a link in a control system. In unsteady modes of the sailing of a vessel there are additional dynamic errors of transients which can considerably exceed the management error.

For full estimation of accuracy of control of a vessel on the set route it is necessary to establish the degree of coincidence of an actual and a required trajectory.

On Fig. 1 and 2 realizations of trajectories of movement of the vessel in the identical conditions executed by one navigator are shown. From drawings it is clear that in both trajectories the maximum lateral evasion is identical. However in the second case β and K are much less when similar values in the first case. Smaller values of β and K in the second case proves that conducting was carried out more precisely than in the first one. The number of correction in the first case makes three and in the second it is one less.

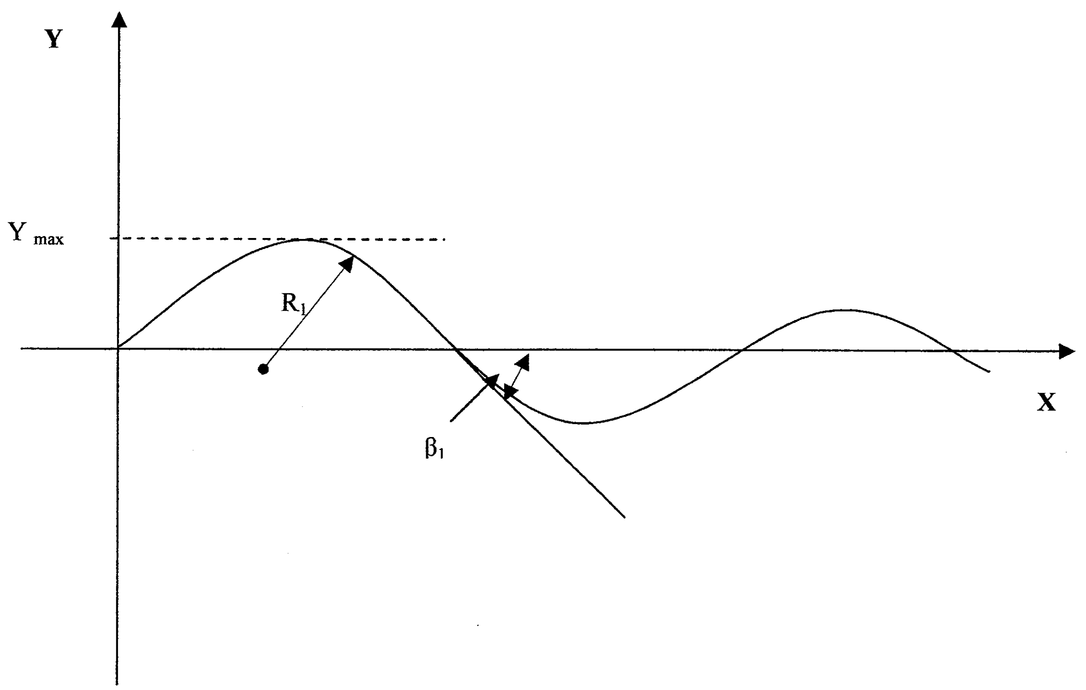


Fig. 1

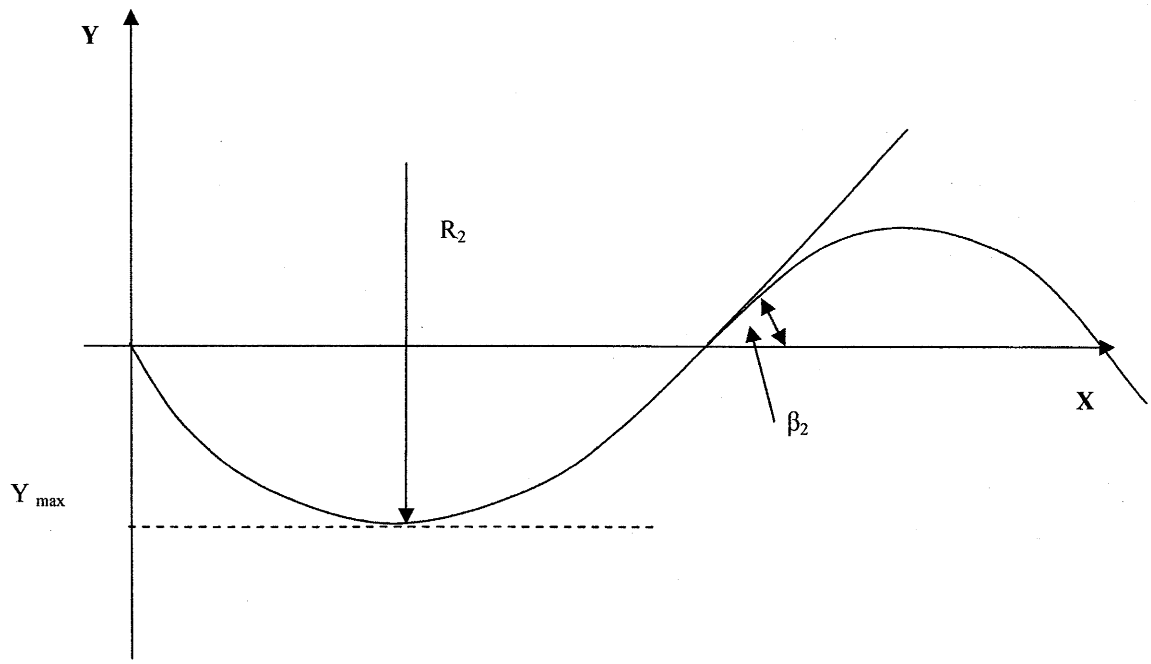


Fig. 2

The technique of the data processing, received on the separate trajectory, allows to estimate quality of work of the navigator – the basic link in the ergonomic system "vessel-navigator". Trajectory indication allows us to find the reasons of supposed errors of management and to find ways of their elimination and prevention. On the basis of trajectory indications the system of estimation of work of navigators which serves as the important means in the practical system of training of navigators is developed.

The final stage of the process of movement of the vessel is the mooring operation.

At the first stage of mooring the vessel of the quay on a trajectory as much as possible removed from navigating dangers and port constructions. Of all the line of movement the necessary zone of navigating safety is accepted. The first stage comes to an end with the vessel turn to the necessary side and progress clearing.

The second stage of mooring has an ultimate goal of direct rapprochement of the vessel with the quay. The distance to the object which with good reason it is possible to consider as a navigating danger for the vessel is purposely reduce. At mooring the contact of the vessel with the quay which is considered bump (heap) absolutely necessary. This difficult operation contains notorious risk because if the energy of bump would exceed the admissible value, the vessel and/or quay damages were resulted.

The complicated movement during this bump (heap) can be presented as the vector of speed of the center of mass V (or its components V_x and V_y) and angular speed of rotation of vessel ω .

For a full estimation of quality of mooring it is necessary to receive the following parameters:

$\eta = E/E_n$ – relative energy of bump (heap) (the relation of actual energy of bump (heap) to the admissible one);

φ – the angle between the middle-line plane of the vessel and the quay at the moment of bump(heap) or the vessel stop at giving of the mooring ropes (should be not more than five degrees);

V – the vector of the forward speed of movement of the center of mass of a vessel (or its component V_x и V_y);

ω – angular speed of rotation of the vessel at the moment of contact.

As the estimation of the activity of a navigator in a control system it is necessary to consider "working mood" which can be of three kinds:

- Faultlessness, when the basic motive of behavior is the inadmissibility of any errors, the accuracy and the performance time are of minor importance;
- Accuracy, when the basic motive is the required level of accuracy, faultlessness and performance time are of minor importance;
- Rapidity, when the basic motive of behavior is the performance of the work in the possibly shortest time, the faultlessness and the accuracy are of minor importance.

The mixed working mood, faultlessness and accuracy dominate in the shiphandling.

4. THE OBJECTIVE CONTROL OF ACCURACY OF NAVIGATION

Training of navigators is affected on specially equipped ranges. The ranges are equipped with navigational measuring instruments with which the model movement is made and the trajectory managements are effected. The schemes of the above ranges for the performance of the problems conditionally termed as "Movement on a Waterway", "Turn" and "Mooring" are presented on Fig. 3, 4, 5.

The location of the navigational marks and measuring equipment as well as the system of coordinates accepted for the processing of supervision results are presented on the schemes. Processing of results of the trajectory management for the purpose of subsequent analyses of activity of the navigator is made on PC by means of algorithm developed with the references of the fulfilled problems.

The problems "Movement on a Waterway" and "Turn" consist in vessel conducting on the set route and its deduction in the established lane wherefore the basic indicators of quality of performance of these problems are sizes of lateral deviation of the extremities of a vessel from the set route. By the sizes of lateral deviation it is easy to determine all the other indications characterizing of the reliability of conductive of the vessel and the degree of coincidence of set and actual trajectories.

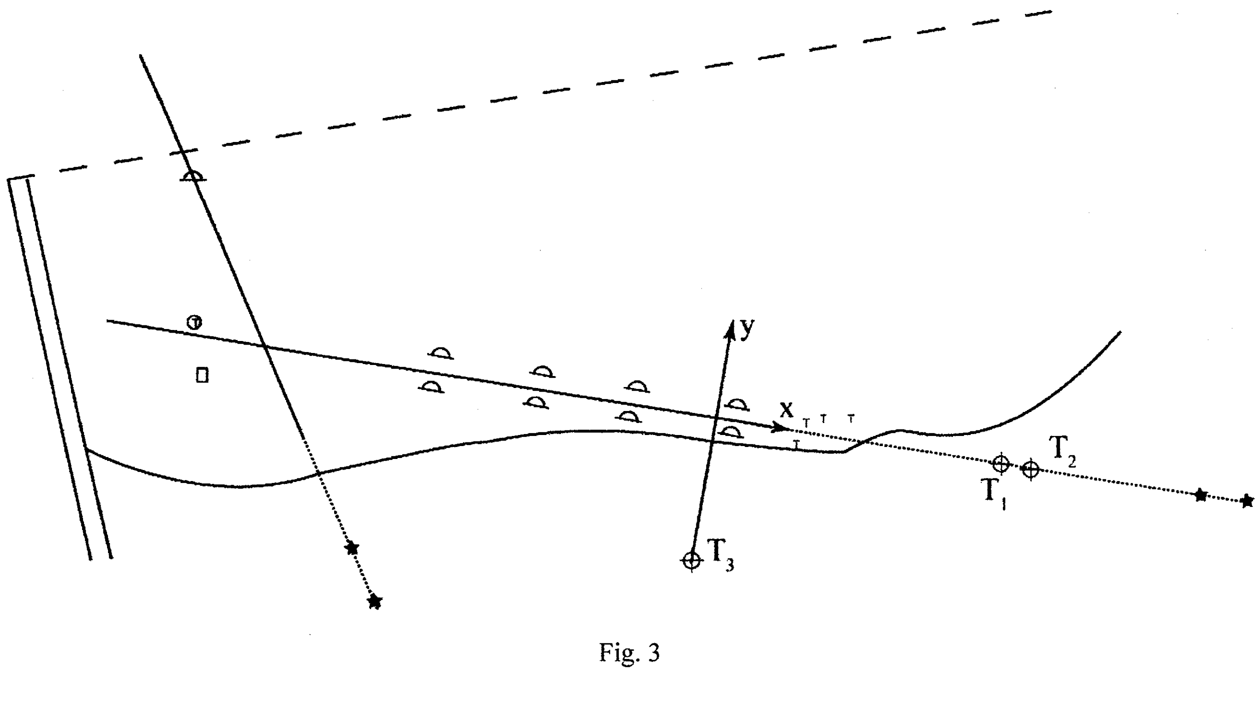


Fig. 3

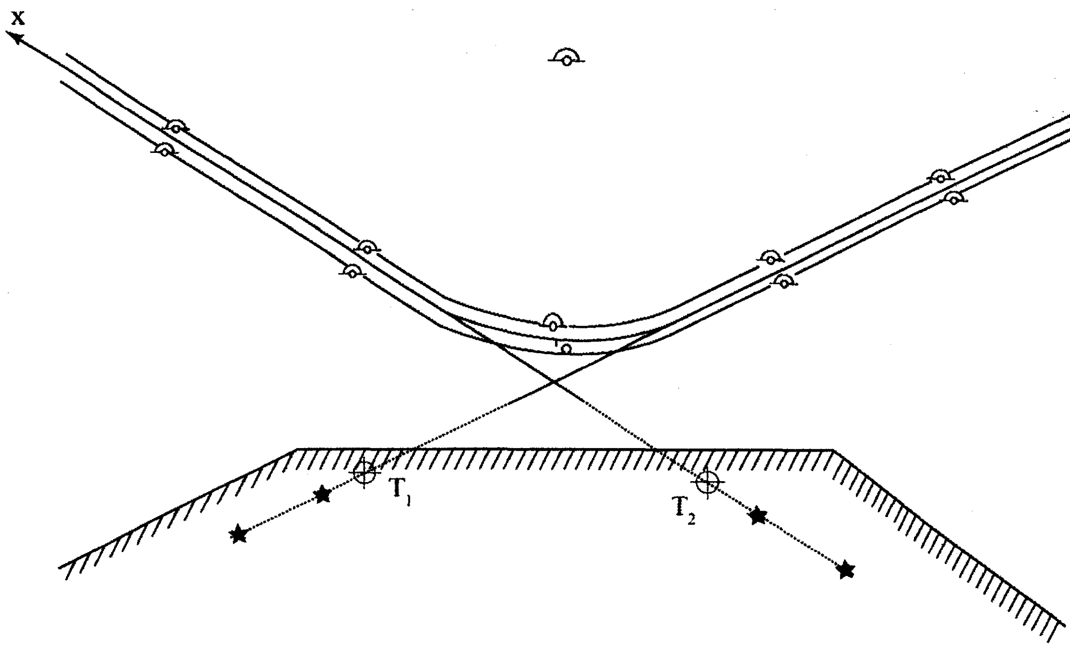


Fig. 4

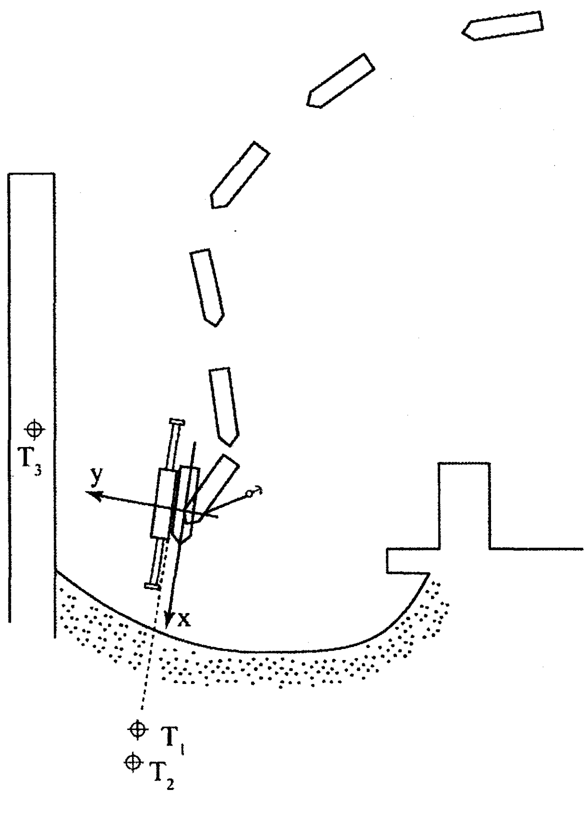


Fig. 5

The problems "Movement on a Waterway" and "Turn" consist in vessel conducting on the set route and its deduction in the established lane wherefore the basic indicators of quality of performance of these problems are sizes of lateral deviation of the extremities of a vessel from the set route. By the sizes of lateral deviation it is easy to determine all the other indications characterizing of the reliability of conductive of the vessel and the degree of coincidence of set and actual trajectories.

By the following values are calculated by means of the measurement results; the waterway excess; coordinates of the center of mess of the vessel; lateral deviation of its extremities from the conducting excess.

When effecting the problem "Turn" the vessel movement is supervised by measurements of the course angle of the motionless buoy φ located in the center of curvature of a rotary part of the set route and two set angels.

For the estimation of activity of the navigator when solving the problem "Mooring" it is necessary to determine model trajectory characteristics (φ, X_g, Y_g, Y_n, Y_k),, angular and linear speeds of its movement (ϖ , V_{xg}, V_{yg}, V_{yn}, V_{yk}), and also, in case of contact to a berth, the relation of actual energy of bump(heap) E to standard for the given vessel and berth E_n.

The characteristics of the position of model (φ, X_g, Y_g, Y_n, Y_k) are calculated by means of formulae: X in this case is directed in parallel to the berth and is departed from it on the size of the sum of the semiwidth of the vessel and the thickness of the fenders and the axis Y is perpendicular to the berth through the middle of its technological platform as it is shown in Fig. 5. Speed parameter of the model movement is calculated by means of to consecutive values of corresponding coordinates. Also, the energy of ship bump (heap) on the berth are calculated in a similar way.

5. CONTROL OF THE LEVEL OF TRAINING OF THE LEARNING EFFICIENCY

In conformity with the works /6 – 9/ the process of practical training is reduced to consecutive presentation to the navigator of the problems, the repeated solution of which leads to the occurrence of the corresponding skills in the dosed acting on the controls. It is possible to present process of practical training in the form of the curves shown on figure 6. where *n* is the number of cycles of presentation to the navigator of the problems which are subject to solution; W(n) – criterion function of management or a curve of change of a local trainability measure of a navigator; σ(n) - is a curve of change of an average quadratic deviation of criterion function of steering the vessel in the course of skill formation.

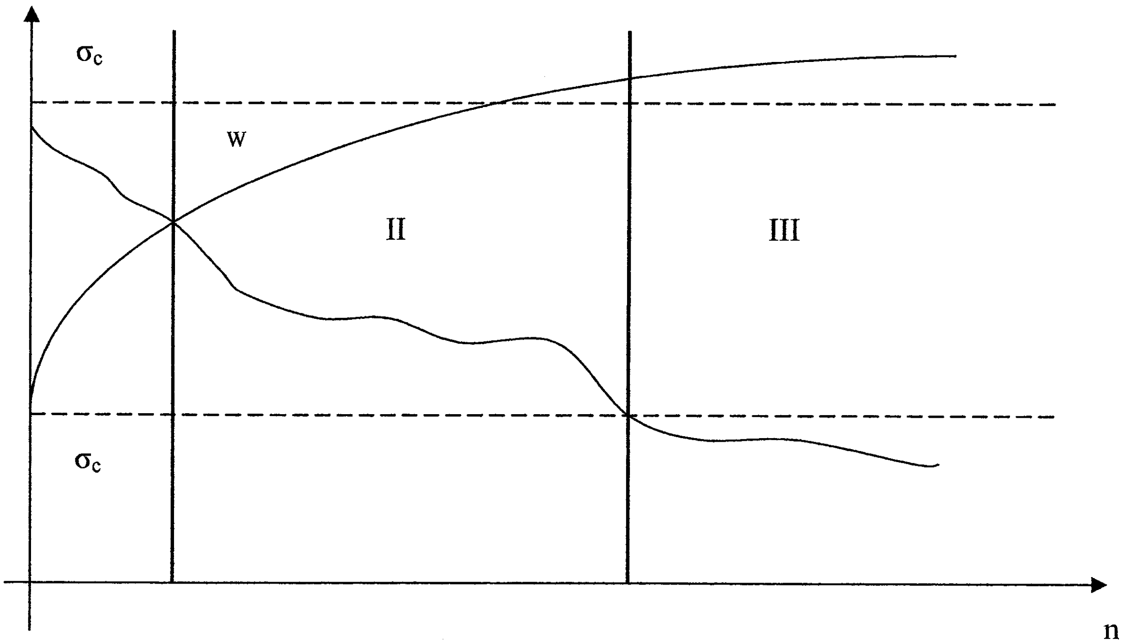


Fig. 6

Fig. 6 shows the initial stage of the habituation of the navigator to the peculiarities of steering the vessel on which his structure of activity is formed.

Stage II is the process of formation of skills in which limits the trained navigator knows the program of the task performance, but his actions are still in sufficient exact and timely.

Stage III is the process of statistically stable level of the skills which has arisen in the course of training. It is evident that for formation of steady skill at stage three it is necessary to provide some stock of additional cycles of training.

As the rule acquisition of skills occurs much faster than their forgetting. Besides, eventually (with each subsequent cycle of training the acquisition of skills is carried out with greater ease, and their forgetting goes more and more slowly.

Well organized program of training should provide stages on which the trainee would receive the data of his performance and the information of his progress. At the final stage his should receive data on the general level of training and also on his weak sides in order to pay a special attention to the farther practical activity. Thus the evaluation becomes a part of the system of training and cooperate both with it and with training problems. Therefore with the reference to the problems of navigation the evaluation should be carried out on the basis of the objective criteria, characterizing accuracy, reliability and the speed of activity that finally determines probability of performance of the problem put before the navigator.

With reference to the problem considered above "Movement on a Waterway", "Turn", "Mooring" the ten points system of estimation of the activity of the navigator, characterizing first of all the quality or accuracy of performance of the problems is developed. The estimation is made on two stages on the basis of two criteria with different priority. The criterion with higher priority allows to state the approximately estimation reflecting the most important result for the problem. The additional criteria is intended for specification of the estimation taking into the account the most essential factors from the point of view of the problem being solved.

While steering a vessel the basic indicator of complexity according to all above, may be the quantity of the operated co-ordinates. For example, when steering the course on the compass the common law of work of the operator (or an automatic regulator) is.

$$\varepsilon_c = - K_\omega \, \omega - K_\Psi \, (\Psi - \Psi_z) - K_\alpha \, \alpha,$$

where ε_c – a signal of mismatch of the set and the actual courses;

α – angle of a return of a wheel;

ω – the angular vessel speed;

$K_\omega, K_\Psi, K_\alpha$ – regulation factors.

When steering a vessel by means of autopilot regulation factors are fixed. The operator operating the vessel purposely changes them in a wide range.

Thus steering a course is carried out on two coordinates.

Let's agree to define the complexity of the problem in 3-point system depending on the number of operated coordinates : "one" is a simple problem which contains less than three coordinates, "two" is an average complexity program containing from four to five coordinates and "three" is a complicated program containing more than five operating coordinates.

For example, when sailing by a waterway or a channel equipped with the system of leading marks and buoys, the law of steering the system regulated on cross-section displacement is determined by expression.

$$\alpha = - K_{\Psi}\, \Psi - K_{\omega}\, \omega - K_Y Y - K_{\acute{Y}} \acute{Y},$$

where Y – is a lateral deviation of a vessel from the conducting axis;

$\acute{Y}$ – speed of lateral deviation.

Thus, steering the course should be regarded as simple problem, vessel conducting in the channel, carried out on four operated co-ordinates, belongs to problems of average complexity.

When a vessel moves in the constraint water aria to the mooring place both the operating coordinate and the control facility constantly vary. The navigator should consider and operate the following co-ordinate simultaneously: value of speed, longitude of the central of gravity, cross-section displacement of the bow and the stern of the vessel, the angular speed and the course. In this case the number of operated coordinates is more than five and the problem belongs to the category of the difficult ones.

A relatively easy problem is characterized estimated by 1 – 2 points, a problem of the raised difficulties – 3 – 5 points, a problem of limit difficulties – 6 points. Using tables 1 and 2 the estimation of difficulty above six points is possible in some cases which prove the impossibility solving such a problem at a high level at a stable manner.

Table 1

$\bar{B}_1$	Mark T	Marks' increasing											
		$\bar{r}$	ΔT_1	$\Delta\varphi,°$	ΔT_2	$\bar{h}$	ΔT_3	Wind's Force	ΔT_4	Gale	ΔT_5	Currents	ΔT_6
≥ 6	1	≥ 10	0	≤ 30	0	$> 1,2$	0	≤ 4	0	≤ 4	0	$\leq 0,5$	0
4–6	2	5–10	+1	30–60	+1	$\leq 1,2$	+1	5-8	+1	4–5	+1	0,5–1,5	+1
2,5–4	3	< 5	+2	> 60	+2			> 8	+2	> 5	+2	$> 1,5$	+2

Table 2

$\bar{B}_1$	Mark T								
		$\bar{B}_2$	ΔT_1	$\bar{h}$	ΔT_2	Wind's Force	ΔT_3	Gale	ΔT_4
≥ 2	2	≥ 4	0	$\geq 1,2$	0	≤ 4	0	≤ 3	0
< 2	3	< 4	+1	$< 1,2$	+ 1	5–8	+1	4 – 5	+1
						> 8	+2	> 5	+2

Requirements of the system vessel-navigator-water area influence a separate problem establishing criteria (speed, accuracy, faultlessness) for its solution.

All the people suppose that there is "something" in the problem containing the answers to the questions how a navigator should be taught to enable him to solve properly any real problem. But what is that's "something"? Where can it be observed in the solution of a problem? Where in a problem we can find the skills and the knowledge to be acquired in the process of its solution?

If the purpose of a training problem consists in training, it is possible to state the following: the person being trained who has made many errors and has corrected them has learned more than the one whose actions all the time were correct. On this ground it is possible to state that the estimations of skills and knowledge are expressed in the form of errors the information of which can be received on the basis on the objective control of accuracy of navigation and a faultlessness of operations.

Critics of simulator training assert that the big realism and fear of an error compels the trainees to use the usual cautious methods of steering a vessel which they have acquired earlier in the course of their previous practical work. In such conditions the acquisition of new skills of steering a ship proceeds slowly enough and often does not bring success. As a basic methodical precondition applied in the training centers the following thesis is put forward: training on a simulator gives much more then the acquisition of skills. It is possible to consider that it is an acquisition of an additional experience on the bases of already existing one. Therefore the training process should be based on the application of complicated and difficult problems and create still greater attention, than the experience of navigation allow.

The similar technique is applied for training of operators of control systems of the movement of air transport. The results of the work of the operators trained in the conditions of constantly high load were better than those of the operators trained in the conditions of constantly raising load.

The training main objective is to provide a required professional standard. Thus, the unequivocal formulation of the purposes of training is impossible without allocation of those abilities which the navigator should acquire in the course of training. Selection of these abilities is made taking into account standard requirements to the navigator and those concrete conditions of sailing he will face in the course of practical activities. With reference to navigation in the constrained conditions it is necessary for the purposes of training to single out three levels of abilities which are connected with three types of problems:

- Training to concepts, that is mastering of essence of the physical phenomena of the inter action of a vessel with the environment and control of a vessel in the constrained conditions.
- Training psychomotor skills of the control process of a vessel, working out of a fast and economic way of operative thinking and decision making.
- Training the solution of problems working out of a predictive way of thinking, ability to use the acquired skills in new conditions.

The first level of problems of training is the training of the concepts and principles should be academic, based on the modern level of our knowledge of process of movement of a vessel and its interaction with the environment.

Unlike training of concepts and principles which basically never comes to the end i.e. their full and definite understanding is never achieved, it is possible to present psychomotor skills as the possession of the final optimal level of mastering. It does not mean that the perfect possession is achieved by all the trained ones, simply it is possible to analyze actions and the description of types of reactions optimal for realization of activity by means of algorithmic methods.

Algorithmic procedures of the management are represented by a sample of legibility and clearness. Determinacy and the productivity peculiar to them regulate reception of unequivocal results at the identical initial data. If a person in everyday life could use only similar procedures of the solution of problems, his behavior could be completely predictable. However it is known that any systems in which "elements" are people will be necessarily not reflexible. Different navigators differently react on external influences. A navigator processing the navigator information makes a decision resultative from compromise, adaptation of his own interests, objectively inherent or the way he understands them, to the peculiarities of the environment and external influences included. Therefore the algorithmic procedures in steering a vessel do not meet determinacy requirements. That is what we name (fuzzy) algorithm in which the system of instruction sets some procedure with a certain sequence of steps, some of which are unequivocal and others are understood not uniquely.

Psychomotor skills are realized in the exercises made up on the basis of quasialgorithms, i.e. on the purposeful and multiple repeated actions for their improvement.

On the basis of concepts (knowledge of the physical basis of control) and skills the ability of the navigator is formed to solve problems, this ability is shown by the solution of non-standard (heuristic) problems and offers a good orientation of the navigator in new conditions and acts not a simple repetition of the last experience And includes not only simple repetition of the last experience bur includes a creating element. The ability and skills develop in indissoluble unity. On the one hand mastering the circle of skills is necessary for formation of abilities on the other one a navigator possessing certain abilities can master new skills /6 – 8/.

CONCLUSION

The necessary condition of any training and learning process is the interrelation between the instructor and trained navigator. Creation of steady skills depends to a great deal on the ability of the instructor to consolidate the learning process of navigators to motivate them and to create the positive relation to new cognition. It is obvious that any training occurs in the conditions of some motivation but an optimum level of motivation type exists for each individual. It is possible to tell that at two strong motivation results in passion and an error consequence is despair so, eventually, the individual comes back to habitual comfortable behavior and ceases to study. The standard complaint of the navigators attending the courses is well-known: too much material, not enough time to assimilate it and in general all of it is of purely academic interest.

The most effective way of teaching is creation of emotional positive atmosphere in interrelations between the instructor and the navigator based on respect of human dignity of each other. In other words the instructor should not only teach but also cause the pleasure from training. Hands the ability of the instructor is to provide a reinforcement which is one of the decisive stages of training.

The reinforcement theory is based on the understanding that the uneasiness generated by the thread of punishment hampers the cognitive ability and the reinforcement of correct action not only strengthens the performance of actions but also creates favorable conditions for the father training: the success generates success, failure conducts to failure.

In a big number of groups the instructor can not support each correct step of the trainees. Usually he uses the group for an indirect reinforcement of individual actions. For example, discussion of correct result of any fragment of studies naming those who has successfully coped with the problem “steering”. However in this case the praise of the correct action is perceived by the others as the censure of incorrect actions. This eternal dilemma of training of a big group can only be resolved by reduction of number of those trained to that limit at which the individual training can be provided.

An integral part of any system of training is the control and estimation of the results of teaching and learning. The estimation of the level of training of a navigator should be based on the analysis of the parameters defining the exact temporal and reliability indicators of his activity and characterizing finally probability of the performance by him of the task in view. The estimation of each trained should depend on the success level of performance of the tasks by all group from a degree of achievement of the programmed purposes of training by them. Estimations at all stages of training specify the optimum ways of transition from one stage of training to the other, up to its end. It is necessary to underline that estimations should concern not only the actions of those trained but also the activity of the instructor: the feedback allowing to improve the activity which is necessary for it.

References

[1] The directory of the engineering psychology / By B. F. Lomova – M. Mashinostroenie, 1982. – 368 p.

[2] Kondrashikhin V. G. The theory of errors and its implementation in the navigation.-M.:Transport, 1969. – 256 p.

[3] Borisov V.V., Kruglov V. V., Fedulov A. S. Fuzzy models and networks. – M.:Hot Line – Telecom, 2007. – 284 p.

[4] Intelligence systems in marine research and technology / Nechayev U. I. et al. SPB: SPB STMU, 2001. – 395 p.

[5] S. Haykin Neural Networks: A Comprehensive Foundation. 2nd Edition. Prentice Hall, 2006. – 1104 p.

LIBRARY AFLOAT: EDUCATING MARITIME STUDENTS AT SEA THROUGH LIBRARY SERVICES

Constantia Constantinou,
Director, Stephen B. Luce Library
Maritime College, State University of New York, USA
Master of Library and Information Studies & Master of Arts
E-mail: CConstantinou@sunymaritime.edu
Shafeek Fazal,
Deputy Director, Stephen B. Luce Library
Maritime College, State University of New York, USA
Master of Library and Information Studies & Master of Engineering
E-mail: sfazal@sunymaritime.edu

Abstract. As a part of the SUNY Maritime College training and education the SUNY Maritime College cadets are required to participate on three summer sea terms aboard the Training Ship Empire State VI. Each summer, the cadets travel across the world, learning about the maritime industry, attend classes and courses as well learning the operations of the ship. The Stephen B. Luce Library shares the educational mission of the college by supporting the *Training Ship Empire State VI* with a library of collections, services and personnel. During the 9-weeks' long semester at sea the librarian onboard the Ship's Library is actively involved in planning and conducting the research needs of the cadets, faculty and crew. Staying on course with the college's strategic directions, the Ship's Library provides the focused collections and resources such as books, magazines and journals, research pamphlets, electronic resource and audio visual material needed for courses and training at sea. "Library Afloat: Educating Maritime Students at Sea through Library Services" describes the ship's library operations and collections in support of the courses taught at sea. In addition, the paper demonstrates how a successful library support enhances the maritime student education at sea.

INTRODUCTION: SUNY MARITIME COLLEGE AND THE LUCE LIBRARY

SUNY Maritime College is one of the 64 colleges and universities of the State University of New York system. A four-year college located at historic Fort Schuyler in Throggs Neck, New York offers a solid academic program coupled with a structured cadet life in the regiment for both men and women. Maritime College prepares students for careers through a content-centered curriculum and a hands-on, team building approach to learning. Maritime offers undergraduate and graduate degrees, 23 varsity athletic teams, summer training cruises to Europe, United States Coast Guard license and intern programs, SUNY Maritime College web portal [1].

The Stephen B. Luce Library of SUNY Maritime College is accredited by professional organizations such as the Middle State Commission on Higher Education and it adheres to the standards and guidelines of the Association of the College and Research Libraries of the American Library Association, American Library Association [2]. The Luce Library is the oldest academic maritime library serving the community of the oldest maritime academy in the United States, SUNY Maritime College, founded in 1874. The Library's collections and resources support the research requirements of the maritime disciplines in engineering, science and the humanities.

In the United States, the maritime curriculum is taught with academic content and rigor that serve specific sectors of the maritime industry and further the professional opportunities of graduate students. With an unusually large number of credits and undergraduate requirements, in addition to semesters at sea and merchant marine license exams, the maritime curriculum prepares and positions its students for high-level professional opportunities. Due to the rigorous academic demands of the maritime core curriculum, the Stephen B. Luce Library of SUNY Maritime College has developed instructional program for research information services and information literacy which is both equally rigorous and complementary to the maritime core curriculum. The Library's instructional program serves the teaching and learning needs of the SUNY Maritime College through instruction, assessment, and evaluation of scholarly material (print and electronic) ashore and afloat.

The study "Library Afloat: Educating Maritime Students at Sea through Library Services" demonstrates the Stephen B. Luce Library's instructional program for research, information services and information literacy in educating cadets on board on *Training Ship Empire State VI.* The cadets of SUNY Maritime College sail for nine weeks aboard the *Training Ship Empire State VI* attending courses while practicing seamanship. The Ship's Library is equipped with print and electronic collections with a professional librarian onboard to instruct the cadets on the use of library resources for their research. In addition, the Ship's Librarian conducts research sessions on the information needs of all crew members as visitors to international ports and a port facts sheet supplements these sessions.

SHIPS' LIBRARIES: READING AT SEA

The mariner has always been subject to loneliness at sea. Loneliness at sea is a condition which has been described in the medical science as "nostalgia," in poetry and literary works as well as in paintings and art, Simpson & Weiner [3]. In eighteen and nineteenth-century iconography sailors were shown with a book in their hand. The book played an important part in the recreation and pastime of a sailor at sea. Reading helped dispel the loneliness and boredom of hard times at sea and provided of the few intellectual pastimes available on shipboard, Skallerup [4]. The desire to read and especially to learn at sea is evident in various accounts. Ships carried books for beginners such as books learning to spell, grammar and arithmetic books, Dana [5]. The bible and other religious texts were among the most frequent reading materials. Frequently sailors read aloud to their shipmates so that others may learn to read. Historical accounts describe the living conditions aboard ship were both conducive and prohibitive to reading. At times there were many opportunities for seamen to read but other times due to the bad weather conditions, darkness and fatigue prevented the sailors from reading.

The quantity of books and type of books accessible to seamen at sea varied from ship to ship. Popular literature of the day found its way aboard ships in the sea chests of sailors. In addition to religious books there were ephemeral literature of the street which consisted of lurid and sensational stories, political pamphlets and books of amusement, Skallerup [6]. Medical books were written for masters of merchant vessels who needed information and advice on how to treat sickness and injury among their men. *The Sailor's Physician* by Dr. Usher Parson was an early American works that was found on ships between 1824 and 1867, Skallerup [7]. The first evident of a librarian onboard a ship is mentioned in the preface of *The Cabin Boy's Locker* (1853), a collection of stories featured in the *Sailor's Magazine.* The Cabin boy was usually aboard the passenger ships; instead of serving wine, ale and hard liquors, he would hand out books to passengers for leisure reading and maintain a chest of books.

STEPHEN B. LUCE LIBRARY AFLOAT

It has been a long tradition for the SUNY Maritime College to sail with its library during the summer sea term for two months aboard the Training Ship *Empire State VI.* Library records show that the Stephen B. Luce Library afloat has been in support of the education of the cadets at sea since at least since 1961. The Library aboard the school's training ship *T.S. Empire State* is staff with a professional librarian who is a member of the library faculty, furnished with collections, services, and the professional knowledge and expertise to carry out the education mission of SUNY Maritime College.

In 1962, the Library Director, Dr. Joseph Whitten, joined the crew of the *T. S. Empire State IV* as the first Ship's Librarian. In his Librarian's Log he wrote: "It seems important that the Ship's personnel recognize the importance of reference, academic and advisory services. This end should be achieved, in part, through the presence of a professional librarian. It certainly shows the interest of the Library in the total college program and should give all personnel that the Library participates in all aspect of the program," Whitten [8].

EDUCATION AT SEA

SUNY Maritime education and training continues at sea onboard the 565-foot training ship Empire State VI, one of the largest and best-equipped training ship in the United States and also the only training ship with a full service library. During the annual Summer Sea Term, which is a mandatory part of the curricula, the *Empire State VI* sails more than 8,000 nautical miles and visits a minimum of four international ports over the course of nine weeks. The rigorous and demanding sea term provides cadets with the opportunity to experience hands on training in leadership and responsibilities of all aspect of ship operation under the supervision of licensed officers and staff. As outlined in the college catalog, the main goals of the Summer Sea Term are, SUNY Maritime College [9]:

1. To provide an understanding of shipboard organization, administration, facilities and functions of the various departments of a merchant vessel.
2. To develop a full appreciation of the principles of command, to train Cadets in the duties and responsibilities of watch officers and other supervisory personnel, and to promote a complete understanding of the duties and responsibilities of personnel in general.
3. To supplement ashore classroom instruction in professional subjects through practical application aboard the training ship at sea.
4. To promote an understanding, through practical experience, of the leadership, teamwork, techniques, and technical skills required to manage and operate a vessel efficiently, safely and economically.
5. To enhance cultural and professional backgrounds through as many contacts with the geography, history, and national distinctions of other countries and peoples, as the limited time allows.

Cadets pursuing a professional license as a United States Merchant Marine Officer are required to take a minimum of three Summer Sea Terms. Cadets aiming to qualify as a mate undergo extensive (basic, intermediate, and advanced) training in ship operation and management. While onboard the "deckies" are exposed to rigorous training in the areas of communications, navigation, ship handling, ship operations, safety, and meteorology. Under the supervision of the Chief Engineer and the Senior Engineering Training Officer, Cadets qualifying as assistant engineers receive in-depth training in the ship's organization, interrelationship of the components of an operating engine room, and safety of person and ship. Each cadet must take and pass intensive oral and written examinations, SUNY Maritime College [10].

The Ship's Library functions as an educational and reading center and serves to fulfill the educational and training objectives of the cadets during the Summer Sea Term. The main function of the Ship's Library is to support the curricula of Summer Sea Term. However, with the array of resources and services provided, the Ship's Library fulfills other goals and objectives. First, recreational reading is a major function and users have access to an extensive paperback bestseller collection and a maritime-based leisure reading collection called the GOVE collection. Second, in support of Summer Sea Term goal #5, the Ship's Library assumes responsibility to provide port information, including information on countries, their cultures, their food, and other pertinent information for visitors. The librarian prepares and conducts lectures and creates handouts on port information prior to arriving in each port. Third, the Ship's Library serves as the base for media entertainment, especially in providing access to DVD movies entertainment. Finally, being such a unique and comfortable space, the Ship's Library is often the retreat for cadets to meet socially and have intellectual discussions.

In 1962, then Library Director Dr. Whitten set the standard of having a librarian sail aboard the Training Ship during Summer Sea Term. Dr. Whitten stressed the importance of having a professional to provide reference and other library services. As Librarian Ray Cotter stated in the 1970 Librarian's Report, without the services of a librarian the Ship's Library is just a room full of bookshelves, Cotter [11]. At present, the Ship's Librarian plays a major role in supporting the cadets' education at sea. As a senior officer of the crew the Librarian participates in the cadets' training process by being a teacher, a mentor, an advisor, and a shipmate. The Librarian teaches information literacy classes, conducts port information lectures and creates handouts, leads group discussion sessions, conducts reference service, and generally supports the information needs of the officers and cadets. The Librarian also writes a log of the highlights of the day's activities which is communicated back ashore for posting on a web blog.

Library space

The Ship's Library occupies 2400 square feet on deck four of the Training Ship *Empire State VI*. With a seating capacity for 50 people, the reading room area consists of group study tables, charts & maps tables and lounge chairs. The shelving holds approximately 7,000 books and magazines, and has some shelves specially designed to prevent books from falling during ship roll. The computer area has several networked workstations for student use. The Librarian's station includes a desk with a computer workstation and the network server, audio/visual equipment wired throughout the ship to deliver training and entertainment videos, and a ready reference area with over 200 reference books.

Collection

The Ship's Library collection, consisting of print, media and electronic titles, is geared towards supporting classroom instruction, practical training, licensure preparation, leisure reading, and entertainment at sea. In support of academics the collection is focused on marine transportation, marine engineering, and other relevant areas to meet the needs of teaching and training. A secondary focus is on leisure reading and entertainment, including a collection of adult paperback fiction and the GOVE special collection with true to life stories that stimulate a love of the sea and foster a better understanding of the seagoing profession and life at sea. The Reference and Reserve collections consists of many handbooks, study manuals, and guidebooks in the areas of sailing directions, ports guide and entry, rules of the road, communication, knots, deck officer license study guides, marine engineer license study guides, boilers, engines, turbines, HVAC, country and culture studies and travel guides, language dictionaries, and other related subject areas. Electronic resources include the most updated edition of various official government publications on ocean conditions, navigation, and federal regulations; and official country information and ports guide. *Bowditch Practical Navigator, List of Lights, International Code of Signals, Code of Federal Regulations, Pilot Charts, Sailing Directions, Radio and Radar Navigation*, and *Sight Reduction Tables* are prominent titles available electronically. The media collection is several hundred titles of movies and training videos. The entire collection is cataloged and searchable via the Library's electronic catalog (OPAC).

Technology

The new generation of cadets is far more technology oriented and thus is far more demanding for instantaneous access to information. Similar to Maritime College Library ashore, the Ship's Library afloat is equipped with the appropriate technology to accommodate cadets' mode of learning and information researching, Constantinou & Fazal [12]. The Ship's Library has several computer workstations networked on its local area network (LAN). The Library's LAN is networked to the Ship's intranet which is connected the Ship's satellite communication system. All library computers provide access to electronic publications, information on the Library operations and staff, image and data banks, various training software, and the Library's OPAC. Effective record keeping and management of library operations is done using LibrarySoft, an integrated library management system. Cataloging of books, circulation, patron record maintenance, statistics and report generation are all managed by LibrarySoft.

Library use and operation

While at sea the Ship's Library is heavily used by cadets, officers and the general crew and in recent years usage have increased even more. A decade ago the average use was about 2150 patrons over the nine-week sea term, but in recent years usage have doubled to about 4300 patrons for the term (averaging to 110 patrons per day). The Library opens an average of 12 hours a day while at sea and much less hours while at port due to many other scheduled port activities. The Library is staffed by the Librarian in charge and a few cadet assistants who perform routine maintenance and organization duties. Circulation transactions totals to over 1100 items for the sea term of which 60 % are for items in the fiction and GOVE collection. Apart from borrowing reading materials, cadets use the library to research print and electronic sources to complete deck and engine class assignments. The Librarian answers many reference questions including technical questions on ship operations, ship structure, ship handling, types of vessels and rules and regulations for each type, engine room techniques, engine design and peripheral components. Other reference requests are generally on information on vessels, travel and port information, currency exchange, food and culture, etc.

CONCLUSION

Library Director, Dr. Joseph Whitten, the first member of the faculty to serve as the Ship's Librarian in 1962 wrote in his librarian's log that ¼ of the schools maritime education takes place at sea. Cadets and young mariners receive their most valuable element of their education at sea, aboard ships where they apply their knowledge into practice and experience. Dr. Whitten acknowledged that the library must be involved in the total college program and should demonstrate that to all personnel that the Library participates in all aspect of the students education. Dr. Joseph Whitten's premise serves as the foundation for the Luce Library of SUNY Maritime College to build collections at sea, to develop services and to educate mariners in their natural element and the natural environment of their studies.

Traditionally and throughout history young mariners learned how to read and write and received their education from book they read at sea. The ultimate purpose of educating mariners at sea is to install the ideas of life-long learning in the cadets' minds, behaviors and habits. A new generation of mariners is immersing from the Maritime Academy. These young mariners not only are able of acquiring information and knowledge from ship's library resources but they are also learning how to disseminate information quickly and efficiency. They appreciate and understand and access to information as a critical component to their decision making while they are at sea as much as at ashore.

The library's instructional mission and learning process does not pause, to the contrary, it continues at sea. The Stephen B. Luce Library has come to appreciate that library effectiveness and the education of mariners is not achieved by a way of being at the heart of the academy. The Library's objective in educating mariners at sea is achieved by a way of decentralizing the core and the essence of the library organization; it is achieved by a way for decentralizing the principals of scholarship, maritime institutional tradition, service and access to reach out to the maritime community at sea. It is proven that there is no "one best way" of achieving one's organizational and educational objectives. The maritime community is dynamic and diverse; therefore the library as an organization must be dynamic and diverse. Strengthening the maritime community requires a consistent effort of disseminating organizational access and assets to meet the needs of the floating community. The Stephen B. Luce Library of SUNY Maritime College Library continues to change; it morphs and evolves to become who the maritime community is and it travels to be where the maritime community is, ... at the *crossroads of the vast seas*, Constantinou [13].

References

[1] SUNY Maritime College, "SUNY Maritime College web portal," available at http://www.sunymaritime.edu, SUNY Maritime College, 2009.

[2] American Library Association, "Association of College and Research Libraries Standards and Guidelines," available at http://www.ala.org/ala/mgrps/divs/acrl/standards/index.cfm, American Library Association, 2009.

[3] Simpson, J. & Weiner, E., editors, "The Oxford English Dictionary," Clarendon Press, Oxford, volume X, 1989, p. 535.

[4] Skallerup, Harry R., "Books Afloat & Ashore: A history of books, libraries and reading among seamen during the age of sail," Archon Books, Hamden Connecticut, USA, 1974, p. 204.

[5] Dana, Richard H., "Two Years Before the Mast," D. Appleton and Company, New York and London, 1912.

[6] Skallerup, Harry R., "Books Afloat & Ashore: A history of books, libraries and reading among seamen during the age of sail," Archon Books, Hamden Connecticut, USA, 1974, p. 210.

[7] Skallerup, Harry R., "Books Afloat & Ashore: A history of books, libraries and reading among seamen during the age of sail," Archon Books, Hamden Connecticut, USA, 1974, p. 211.

[8] Whitten, Joseph, "Ship's Librarian Log aboard Training Ship Empire State IV," 1962.

[9] SUNY Maritime College, College Catalog, SUNY Maritime College, 1970/71, p. 77.

[10] SUNY Maritime College, College Catalog: Course Descriptions, available at http://www.sunymaritime.edu/documents/2009/1/16/2008_course_descriptions_01-15-09.pdf, SUNY Maritime College, 2009.

[11 Cotter, Ray, "Ship's Librarian Report aboard Training Ship Empire State V," 1970.

[12] Constantinou, C. & Fazal, S., "Developing Information Literacy for the Maritime Curriculum: Strategy and Pedagogy." Presented at the 8th Annual General Assembly of IAMU, Odesa, Ukraine, 2007.

[13] Constantinou, Constantia, "Crossroads Community: Strengthening the Maritime Academy through Library Scholarship, Tradition, Service and Access," Presented at the 9th Annual General Assemble of IAMU, San Francisco, CA, USA, 2008.

MARITIME EDUCATION AND TRAINING SYSTEM IN GEORGIA

Avtandil Gegenava,
Nadim Varshanidze,
Abdul Kakhidze,
Batumi Maritime Academy
Batumi, Georgia
E-mail: gegenava@gmail.com

Abstract. The article deals with the problems of Maritime Education in Georgia, perspective ways of the Higher Education reform implementation in connection with the requirement of IMO, National Legislation and Lisbon Strategy. The place of maritime education in the system of education of Georgia and the legislative documents on which maritime education is based are shown in the article. System of education of Georgia and, particularly, system of higher education are described. On the example of reform of maritime education in Georgia, we have shown the ways to harmonize the requirements of general documents of Bologna Process with IMO requirements to maritime education. We are certain that general qualification requirements to the levels of higher education described in Dublin Descriptors fully conform to training of seafarers of different levels of responsibility described in STCW convention.

1. A BRIEF HISTORY OF MET IN GEORGIA

Maritime education has a century history in Georgia. The first maritime courses were founded in Poti in 1901. The Military Maritime College was functioning in Batumi since 1921, and Maritime Industrial Technical Secondary School was functioning since 1929.

In 1944 Batumi Maritime Technical Secondary School was reorganized into Batumi Maritime College. During its 50-years history Batumi Maritime College played an important role in development of Maritime Business in Georgia. About 5 thousand specialists with high qualification were educated at Batumi Maritime College for Marine Fleet.

In 1990 on basis of Batumi Maritime College the Training-Consultation Centre was opened. It received the status of Consultation Point of Novorossiysk Higher Maritime-Engineering College which since 1992 was functioning as Batumi Higher Maritime College.

In 1994 on basis of decision taken by the Government of Georgia this college received current status – status of Batumi State Maritime Academy.

In 2006 when the process of education reforms started in Georgia, on basis of decision taken by government of Georgia Batumi State Maritime Academy received today's status – Legal Entity of Public Law – Batumi Maritime Academy (BMA).

There are three MET institutions (all institution located in Batumi) in Georgia:

1. Legal Entity of Public Law – BMA.
2. Maritime Training Centre – ANRI (LTD).
3. Batumi Navigation Institute (LTD).

All BMA and other MET institutions activities are regulated not only by National Legislature but also by International Norms and Standards. Requirements of International Maritime Organization regarding qualification of maritime staff are given in the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW 78/95). Maritime education in Georgia is regulated by three laws (see Fig.1):

1. Law of Seafarer's Training and Certification of Georgia (2000);
2. Law of Higher Education of Georgia (2005);
3. Law of Vocational Education of Georgia (2007).

The control of IMO requirements realization in the sphere of Maritime Education in Georgia is under the control of the Maritime Transport Department and National Legislative issues are in the competence of Georgian Education and Science Ministry.

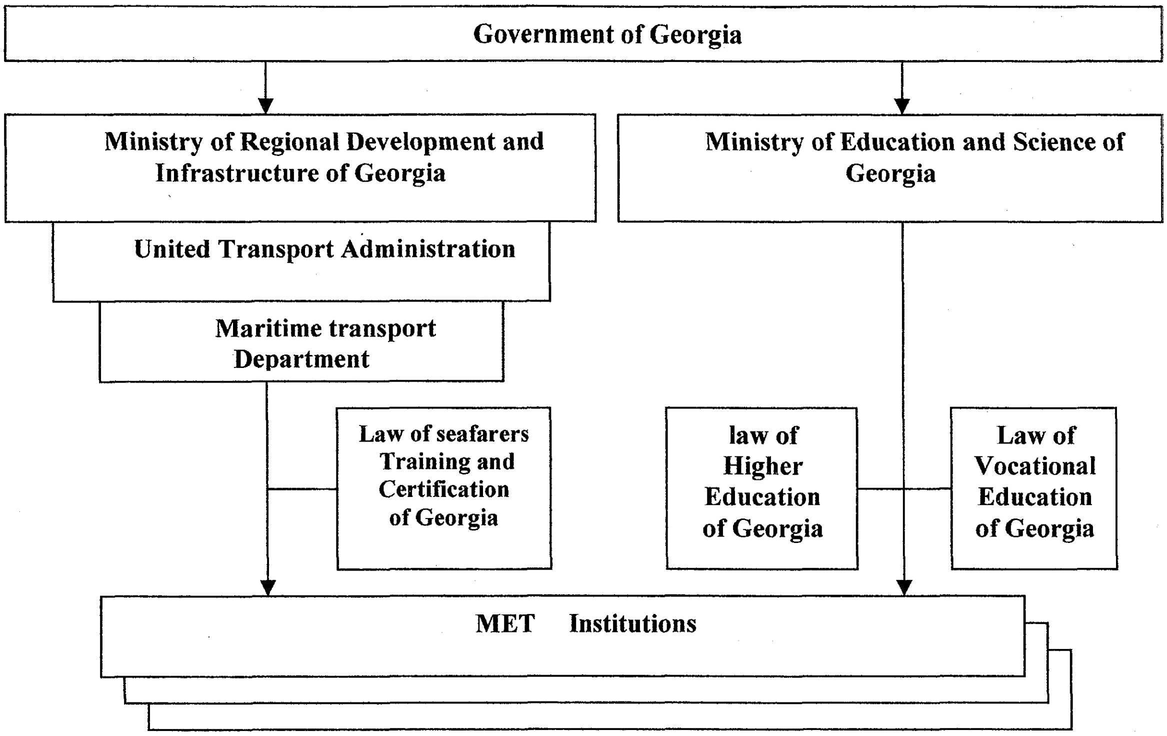


Fig.1. Regulation MET in Georgia

Maritime Transport department, together with Georgian Governemnt for 20 years actively cooperates with IMO and other international organizations:

- In June 1993 Georgia became the IMO member.
- In 1994 – 1995 Georgia joined 25 international maritime IMO and UN Conventions.
- In 1998 The Law of Georgia on Maritime Areas of Georgia (regulating the status of maritime areas) was adopted.
- In 1999 Vessels Registration Regulations, Maritime Incidents Investigation Regulations, Maritime Mortgage Registration Regulations, Harbour Master Regulations, Pilot Service Regulations were adopted.
- In 2000 the following Laws were adopted: On Training and Certification of Seafarers, in accordance with STCW78/95, and On Maritime Search and Rescue Service.
- In 2001 Georgia was included into the IMO "White List".
- In 2002 Georgian Ports Regulations (regulating navigation rules, port customs clauses and port safety, navigation rules) were adopted, Research Centre was established in order to carry out scientific investigations, establishment of national educational literature and new technologies.
- In 2002 – 2003 32 Agreements of Undertaking on Recognition of Seafarers' Certificates of Competency were concluded and the work in this direction is still being carried out.

– In May, 2004 IMO MSC confirmed the position of Georgia in the IMO STCW "White List".

2. THE NATIONAL EDUCATION SYSTEM

A higher education establishment is the important factor of growth and competitiveness of the country and plays a key role in reforms of EU member and partner states. Higher education upgrade was recognized as the basic condition for success of Lisbon strategy which the European Union began in March, 2000 and which aspiring the modernization of economic and social systems within EU. Upgrade of higher education of EU is clearly stated in communications of the European Commission "Mobilization of intellectual elite of Europe: granting of possibility of universities to make their full contribution to Lisbon Strategy" and "Upgrade of universities: Education, research and an innovation".

In 2003 Georgia began the transformation of higher education system according to the principles of Bologna process which is actively supported by the European Commission.

The structure of school system – Elementary school comprises 6 years. Basic (compulsory) school comprises 3 years. After graduation of the basic school a graduate has admittance to Vocational Education.

Before 2007 (acceptance of Georgian Parliament of the Law of Professional Education, there had been three levels of professional education – Basic, Secondary and the Higher).

The existed system did not correspond the market requirements. The problem was that only 4 – 5 % of the graduates were required by the market. The profound reform in the sphere began in 2007. The system of the management, the methodological sphere, and the system of qualification were deeply reformed. Instead of the existed three levels two levels of the professional education were adopted. The aim of the reform became the target preparation of highly-qualified specialists in the short period of time.

Secondary Education comprises 3 years and its graduation a graduate receives a secondary school leaving certificate (see Fig. 2).

Higher Educational System:

There are the following types of higher education institutions in Georgia: College, Institute, and University. There is a three-cycle system in Georgia: Bachelor's Programme -240 ECTS credits; Master's Programme – 120 ECTS credits and Doctoral Programme – 180 ECTS credits.

There is a Certified Specialist's Programme that represents a short cycle with 120 – 180 ECTS credits.

Certified Specialist's Programme – for admission to this level of study a secondary school Leaving Certificate is required. After completion of this programme a graduate is awarded a Certified Specialist's Diploma, those with excellent marks are awarded a Diploma with Honour.

Bachelor's Programme – for admission to this level of study a Secondary School Leaving Certificate is required. After completion of this programme a graduate is awarded the Bachelor's degree (Diploma), those with excellent marks are awarded a Diploma with Honours.

Master's Programme – the owner of Bachelor's or the relevant degree is eligible for a Master's programme. After completion of this programme a graduate is awarded the Master's degree (Diploma), those with excellent marks are awarded a Diploma with Honours.

Doctoral Programme – the owner of Master's or the relevant degree is eligible for a doctoral programme. After completion of the programme and defense of a PhD thesis a graduate is awarded the Doctor's Degree (Diploma).

Access to Higher Education Institution:

Only the applicants who have successfully passed the Unified National Examinations are eligible for state accredited programmes at an accredited higher education institution.

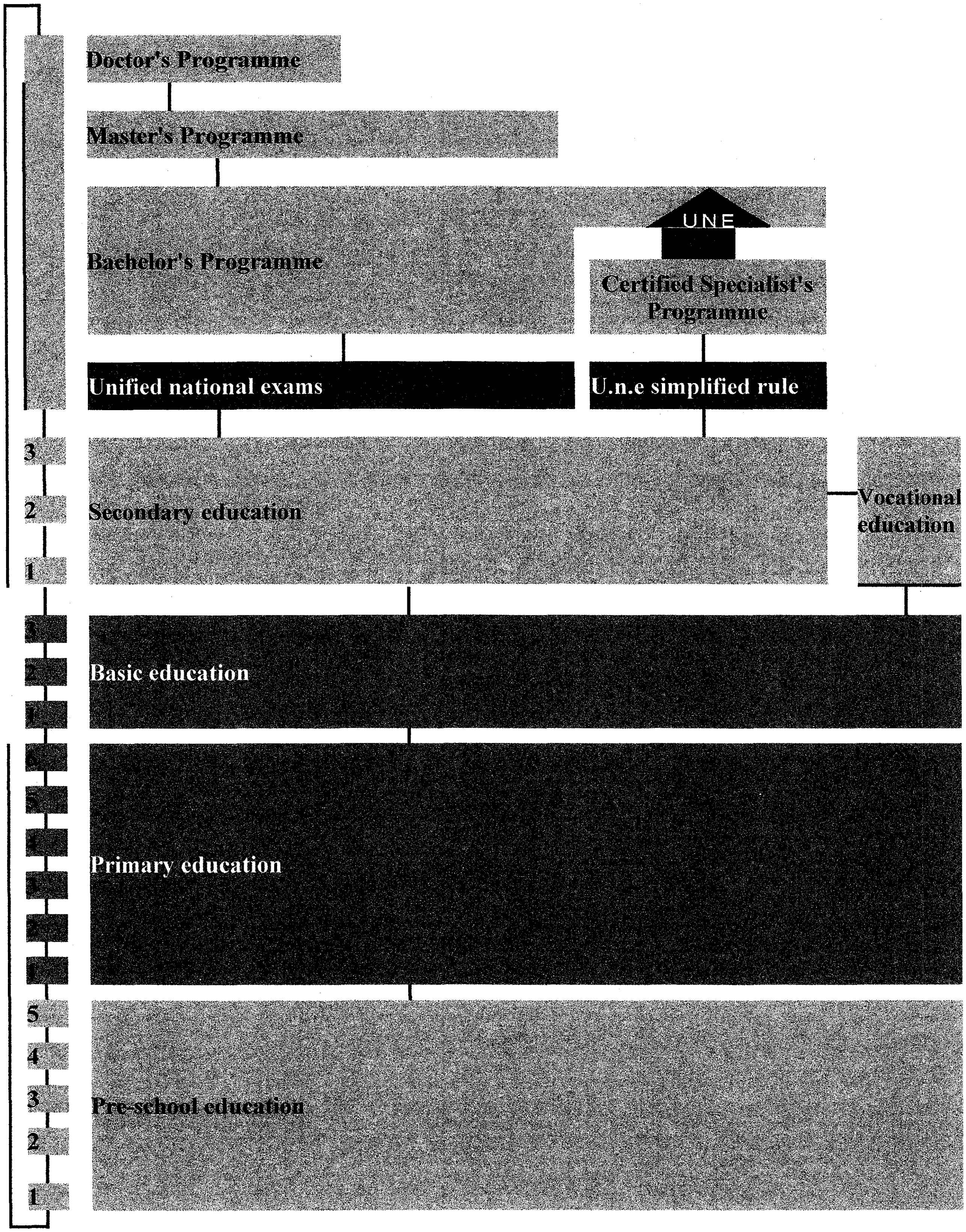


Fig. 2. Schematic Review of Georgian Education System

3. MET OF THE BASIC EDUCATIONAL ESTABLISHMENT IN GEORGIA – BMA

BMA is the basic educational establishment of Georgia. The incorporation of International Standards in preparation of specialists is implemented on basis of cooperation with such authoritative centres of maritime education as Southampton Maritime Institute, Admiral Makarov State Maritime Academy, Maritime Faculty of Istanbul Technical University and World Maritime University in Malmo, Gdynia Maritime University and Odessa National Maritime Academy. Our Academy is a member of Training-Methodological Union of higher maritime institutions of the Russian Federation.

Since 2000 the world-recognized International Quality Management System ISO 9001:2000 is incorporated at the Academy according to the requirements of International Convention STCW 78/95. The system ensures conformity in respect of development of educational programs, methods of instruction and Maritime higher Education specialists training in accordance with International and National requirements of Maritime Law. Batumi Maritime Academy is one of the first institutions in post-soviet area in which this system has been incorporated.

In 2006 BMA joined the International Association of Maritime Universities (IAMU). The aim of this Association is to render actual methodic and academic assistance to Higher Maritime Institutions in such question as preparation of highly-qualified maritime specialists.

At present two faculties function at Batumi Maritime Academy: Maritime and Business and Management Faculty. Training and Certification Centre also functions at the Academy.

Maritime Faculty functions at the Academy since 1992. It comprises three specialties: Marine Navigation, Marine Engineering and Electrical Engineering. During this time the faculty has prepared 2000 highly-qualified maritime specialists. The high percentage of employment of graduate students of BMA (88 % of Navigational, 70 % of Marine Engineering and almost all Electrical Engineering graduates) indicates high level of Maritime education in Georgia.

Educational programs are compiled according to International Maritime Organization recommended Model courses and in compliance with STCW 78/95 requirements. Educational program meet the requirements Law of Seafarer's Training and Certification of Georgia (2000), Law of Higher Education of Georgia (2005), and Law of Vocational Education of Georgia (2007).

When the Law on Vocational Education was ratified, BMA developed and presented two higher professional educational programs ("Marine Navigation" and "Marine Engineering" everyone on 180 ECTS credits) and two programs of the first (support) level ("Able Seamen» and "Motormen" everyone for 10 months of training) for the State Accreditation.

Programs of the first (support) level are trained in the Training and Certification Centre.

Maritime Faculty has Bachelor (Marine Navigation, Marine Engineering and Electrical Engineering) and Vocational (higher professional – Marine Navigation and Marine Engineering) educational programs.

The curriculum of Bachelor Program consists of 240 ECTS credits, 1 ECTS credit is equal to 29 astronomic hours. One academic year consists of 42 weeks. The duration of studies is 4 years and 12 month cadets have shipboard training on vessels of the leading shipping companies.

The curriculum of Vocational (higher professional) Program consists of 180 ECTS credits. The duration of studies is 3 years and 12 month cadets have shipboard training on vessels of the leading shipping companies.

At present 900 cadets study by the Bachelor Program and 160 cadets by the Vocational (higher professional) Program.

The process of studies at the faculty includes classical studies at auditory and also the modern methods of training using the latest simulator and information computer technologies. This is applied as to general as well to special courses. During the whole period of studies the cadets are taught the English language.

Cadets receive the first training practice on the basis existed at the Academy – in tackle, locksmith, and turner's, electric and gas welding, electric installation workshops. Cadets receive the second practice shipboard training on vessels of auxiliary fleet of Batumi, Poti and Kulevi sea Ports where they master how to fulfill duties of sailors, motormen, electricians and get practical working skills necessary for ships' rank.

After the theoretical course cadets have shipboard training, on board the long voyage ocean fleet vessels where they master specialties of junior officers: Navigational watch, Engineering watch and electrician.

On the basis of the training process and bachelor's project results the cadets are given the correspondent bachelor's academic degree in Navigation, Marine Engineering and Electrical Engineering.

After this the cadets pass qualification examination in specialty at the Academy. On the basis of this examination Maritime Transport Department of Georgia issues first Certificate of Competency for Officer in charge of a navigational watch, Officer in charge of an engineering watch, and electrician of second class according to Georgian Law on Seafarers Training and Certification, 2000 and International Convention STCW 78/95.

The Academy ensures the training and certification of its graduate cadets in all mandatory courses which are necessary for work on vessels according to the requirements of International Convention (STCW 78/95).

The graduates of Bachelor Program can occupy the position officer in charge ***(Operational Level)*** including the chief mate position (second engineer) and master (chief engineer) ***(Management Level)*** in conformity with the requirements of Georgian Law on Seafarers Training and Certification, 2000. The graduates of Vocational (higher professional) Program can occupy only the officer in charge position ***(Operational Level)*** (see Fig. 3).

Six departments are cooperated within the faculty. They are: Navigation, Marine Engineering, Electrical Engineering, Foreign Languages, Exact and Natural Sciences, General Technical Subjects Departments. The Academic staff of the faculty is composed of 13 professors, 16 associate professors, 18 assistant professors and 60 assistant lecturers. Among the above-mentioned staff there are 8 Masters Mariners, 7 Chief Engineers, 4 Electrical Engineers, some of them are acting mariners the others have a rich experience of work on board the vessels.

Since 2006 the new Training and Certification Simulator Centre functions at the Academy. The aim of this centre is to train, retrain and certify the students and marine fleet specialists using modern simulator technical means.

The process of training at the Centre is carried out according to the model courses prepared by IMO, the International Convention (STCW 78/95) and the requirements of the National Transport Department. The training courses at the Centre are divided into three categories:

1. Training and Certification in accordance with the "Mandatory" programs, by the new wording of the International (STCW 78/95).
2. Training and certification of seafarers and shipping companies staff according to "Non Mandatory" programs connected to the fleet management, ships safe operation and prevention of environmental pollution.
3. Specialized courses – work with special equipment on certain types of ships or other courses required by ship owner, shipping or crewing companies or other organizations.

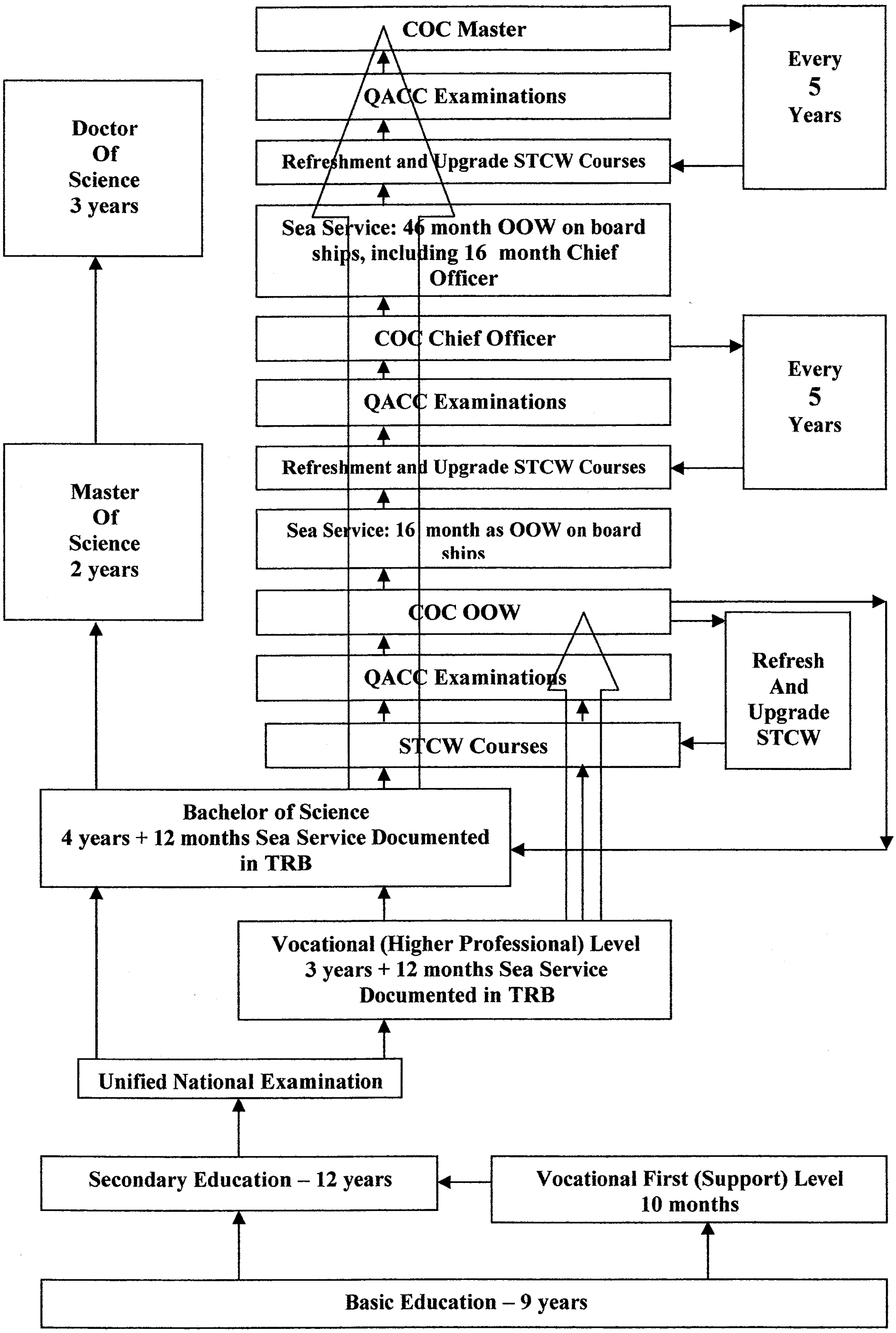


Fig. 3. The Certificates of Competency (Deck) according to the STCW and Law of Seafarer's Training and Certification of Georgia (2000)

All instructors of the Training Centre hold the certificates of special instructors issued by training centers of simulator manufacturing companies. The certificates are recognized by Maritime Transport Department of Georgia.

For the purpose of training and certification the world-famous simulator systems producing corporation "TRANSAS Set the Standard's" simulator systems are used at the Academy.

Integrated navigational simulator – Navi-Trainer Professional 4000 including – instructor's workplaces, main navigational bridge with real equipment, visualization and additional navigational bridge.

GMDSS simulator TGS 4100 including – 1 instructor's and 6 trainee's workplaces, one real GMDSS system workplace.

Engine Room Simulator ERS 4000 including – 1 instructor's and 4 trainee s workplaces, computer-based electrical plant and all equipment and systems of real-size engine room of tanker type ship.

Since the Academy has joined Bologna process trainings are intensively held at the Academy where European credit system; curricula and syllabuses in all subjects for receiving the qualification on bachelor's level are discussed.

The specialists from other countries are invited to the Academy. During the last two years specialists from Canada, the Ukraine, Greece and Turkey visited and shared their experience with the Academy.

Professors' and Lecturer's of the Academy were sent on business trips to Russia, the Ukraine, Poland, Holland, Germany Greece and Sweden.

QACC – Qualification Assessment Commission of Competency.
COC – Certificates of Competency.
OOW – Officer in charge of the watch.
TRB – Training Record Book.

4. CONCLUSIONS

Maritime Academy is managed by the qualified and innovation-aimed administration. In our opinion, the problem is the requirements of the Georgian Law on the Higher education which, being acceptable for big universities, are, at the same time less effective for small specialized institutions like BMA.

At the current level of development we think that the key problem for BMA is the lack of retrain conditions of the teaching staff.

It is especially connected with the instructors of the special subjects who have no experience of the sailing on board the modern ships.

Under the Georgian Law on Higher Education each professor has a right of one-year paid vacation with the aim of professional skills retraining and refreshment.

The key problem of this article realization is the high price for sea training for the instructors of special subjects.

The salary of the instructor of the academy is lower than the salary of the acting mariner, that's why it is very hard to involve the acting mariners to the education process. The second problem is that no all mariners can be an effective teacher.

Taking into account the above problems IMO has developed special methods of preparing maritime officers to academic career which help them to learn methods of training the young people both on board and shore.

One of the means to involve the experienced mariners (first of all masters and chief engineers) is to give them possibility to act at Academy to between the voyages.

The curriculum of the Academy is based on IMO STCW 78/95 requirements and at the same time the requirements of crewing companies, being the key employers of the cadets under the existed contacts are taken into consideration.

We positively estimate the cooperation with the crewing companies. In our opinion the cooperation with them will be more useful in the case the companies will grow their financial share in the sphere of Maritime education.

References

[1] International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as Amended (STCW 78/95) (Consolidated Text), Saint-Petersburg, 2002.

[2] European Parliament and the Council 2003, DIRECTIVE 2003/103/EC AMENDIN DIRECTIVE 2001/25/EC On the minimum level of training of seafarers, Bruxelles.

[3] Convention on the recognition of qualifications concerning higher education in the european region. Lisbon, 11 April 1997.

[4] Shared 'Dublin' descriptors for Short Cycle, First Cycle, Second Cycle and Third Cycle Awards. 18 October 2004.

[5] Bologna declaration/http://ec.europa.eu/education/policies/educ/bologna/bologna.pdf.

[6] Proceedings of The 8th AGA IAMU OHMA Odessa, Ukraine 2007.

[7] Proceedings of The 9th AGA IAMU San Francisco, California USA 2008.

[8] Law of Seafarer's Training and Certification of Georgia, 2000/ http://uta.gov.ge.

[9] Law of Higher Education, 2005 and Law of Vocational Education of Georgia, 2007/ http://mes.gov.ge.

[10] http://bma.edu.ge.

THE INTERDISCIPLINARY CURRICULAR MODEL: ADAPTATIONS FOR A FLUID FUTURE

Graham Benton,
PhD, Associate Professor
The California Maritime Academy
E-mail: Gbenton@csum.edu

Abstract. This essay will argue that interdisciplinary curricula leads not only to innovative programs, but produces the very problem-solving skills that we demand of our graduates. There is a need to train individuals with real, hands-on experience in the maritime world as well as training in the issues confronting managers in the maritime industry. An interdisciplinary commitment that dramatizes the links between business, science, technology and policy prepares students for the volatility of an ever-shifting environment. In part, this paper will document the development of interdisciplinary thinking through new organizational structures at The California Maritime Academy designed to expand offerings beyond the training for licensed officers in order to better equip students for a variety of maritime industry careers. Interdisciplinarity is not just a way of teaching, it's a way of thinking; knowledge regimes too rigidly constructed don't effectively enable critical and analytical processes. Movement towards interdisciplinary models of education may serve to break up the bottlenecks and clear the channels that impede educational growth.

1. INTRODUCTION

The words of Yohei Sasakawa, which frame this conference's themes and concerns, may also serve as the critical springboard for this essay: while it is indeed important for many sections of society to work together, cooperation is not enough and "in tackling new problems, we must first step back and re-examine the fundamental bottlenecks in our problem-solving process" [1]. Such "fundamental bottlenecks" can take many figurative and literal forms in the maritime industry, yet I suggest one impediment to the problem-solving process may reside in maritime education itself. Necessarily bound by multiple accreditation and regulatory bodies, students are often locked into rigid tracks which lead to narrowly-defined roles after graduation which then don't serve the interests of a rapidly evolving industry.

An attention to interdisciplinary curricula leads not only to the creation of new and innovative programs, but will help produce the very problem-solving skills that we demand of our graduates. In his published speech, "Development for a New World Maritime Community", Sasakawa reinforces this perspective. "We are now facing the emergence of new challenges that defy the conventional way of handling problems on a case-by-case basis," he writes; not only are "efforts based on conventional methods and procedures insufficient to deal with such issues," but "to effectively address the relationship between the sea and mankind, we need to discuss maritime responsibility in a comprehensive and cross-disciplinary manner" [2]. Rhetoric such as this mirrors that of many other educators who seek solutions to contemporary social and political problems via education reform – reform not necessarily in pedagogical philosophy or re-allocation of resources, but reform in the very structure of curriculum itself. Writing in the in The New York Times in April of 2009, Columbia Professor Mark Taylor claims: "if American higher education is to thrive in the 21st century, colleges and universities [...] must be completely restructured. The long process to make higher learning more agile, adaptive, and imaginative [includes] restructuring the curriculum – the division of labor model of separate departments is obsolete and must be replaced with a curriculum structured like a web or complex adaptive network. Responsible teaching and scholarship must become cross-disciplinary and cross-cultural" [3].

Also, in the 1995 influential "Report by the Boyer Commission on Re-inventing Undergraduate Education in America," one of the ten principles identified as necessary for educational reform is to "Remove Barriers to Interdisciplinary Education." "As research is increasingly interdisciplinary," the commission states, "undergraduate education should also be cast in interdisciplinary formats. Because all work will require mental flexibility, students need to view their studies through many lenses" [4]. The three recommendations from the Boyer report are as follows: 1) Lower division courses should introduce students to interdisciplinary study; 2) Academic majors must reflect students needs rather than departmental interests or convenience; and 3) Customizing interdisciplinary majors should be not only possible but readily achievable.

2. INTERDISCIPLINARITY, MULTIDISCIPLINARITY, AND CROSSDISCIPLINARITY: DEFINITIONS AND AFFILIATIONS

With all these calls for curricular reform which speak of "multidisciplinary integration," "cross-curricular innovation," and "interdisciplinary studies," it may prove useful to clarify these terms as they are often used interchangeably and with a lack of precision. For the purposes of my argument, I follow the taxonomy generated by Martin Davies and Marcia Devlin in their article "Interdisciplinary Higher Education: Implications for Teaching and Learning," which posits that many different organizational concepts may be subsumed under the more comprehensive term "interdisciplinarity." First, "multidisciplinarity" is simply the recognition that "there are many discrete and autonomous disciplines, and while students normally specialize in one discipline, they can study several over the course of a typical degree program...Multidisciplinarity is the co-existence of a number of disciplines" [5]. Second, "cross-disciplinarity" is a variation of the former model wherein a concept normally outside one's field of study is investigated, yet there is rarely any transfer of methodology in such work. Examples provided by Davies and Devlin include studying the physics of music, or the politics of literature.

"Interdisciplinarity," then, is the broadest of such terms and it can a number of possible forms. According to Davies and Devlin, "at the benign end of the continuum, interdisciplinarity is regarded simply as elective subjects taken from a variety of disciplines that in some way relate to a general topic." On the other end, another variant suggests that unlike multidisciplinarity, this variant requires "more or less integration and even modification of the disciplinary subcontributions while inquiry is proceeding. More specifically, this requires two or more disciplines which combine their expertise to jointly address an area of common concern" [6].

3. GLOBAL TRENDS TOWARDS INTERDISCIPLINARITY IN HIGHER EDUCATION

Lest my previous citations in the Introduction seem to suggest that the call for the dissolution of disciplinary boundaries fall purely within the purview of American education reformists and radicals, such ideas have gained traction in Europe, Asia, and Australia as well. In the monumental "Bologna Process" (or Bologna Accord), certain priorities for the next decade have been established which include a commitment by higher education institutions to be more responsive to the wider needs of society, to create and maintain a broad, advanced knowledge base, and to specifically create "opportunities for mobility in the structure of degree programs. Joint degrees and programmes as well as mobility windows shall become more common practice" [7]. Such opportunities for "mobility in the structure of degree programs" of course already exist, and in his seminal text Higher Education and Interdisciplinarity, John Kocklemans identifies over a dozen interdisciplinary schools within European Universities and also acknowledges that there have been "several recently-founded universities in Europe, particularly in England, France and Germany, in which concern for interdisciplinarity is reflected in the very structure of the institution" [8].

Likewise, in Australia, "The Melbourne Model" incorporates elements of the Bologna Process and of the objectives of liberal education in North America to foster a curriculum which is avowedly international in nature and interdisciplinary in character. According to Marcia Devlin, "one of the five University of Melbourne Graduate Attributes is that graduates are knowledgeable across disciplines. Graduates are expected to have expanded their analytical skills through learning experiences in diverse subjects and have learned to examine critically, and to synthesize and evaluate knowledge across a broad range of disciplines" [9].

In Japan, too, there is interest in interdisciplinary studies: the Integrated Faculty of Arts and Sciences at Hiroshima University works at the intersection of science, humanities, and social sciences on topics concerning the environment and the ethical dimensions of science and technology [10]. At Keio University, (as its website indicates) "contemporary society faces wide-ranging problems caused by multiple factors in different fields. None of these problems can be explained by taking recourse to a single conventional field of study." The faculty, therefore, do not lay down a boundary between the arts and sciences in the aims of "nurturing personnel who can discover society issues relating to multiple areas of study and can solve it as a professional" [11].

4. GLOBALIZATION THEORY AND INTERDISCIPLINARITY

Not only is the interest in interdisciplinary studies a global phenomenon, but in another very real sense, the multiple calls for interdisciplinary education is symptomatic of the social and political forces of globalization itself. If globalization is an empirical condition of the modern world which is characterized by an accelerating network of interconnections and interdependencies, then the complexity of the linkages established by globalization, in the words of John Tomlinson, "extend to phenomena which have traditionally been separated out into various categories: the economic, the political, the social, the interpersonal, the technological, the environmental, the cultural" [12]. Contemporary life (and maritime-related fields in particular) confounds such a strict taxonomy, and therefore the crucial role for the educator in the 21st century will be to move towards interdisciplinary structures that can embrace this multidimensional connectivity. In other words, we can view globalization "as a multidimensional process, which, like all significant social processes, unfolds in multiple realms of existence simultaneously. Accordingly, globalization may be understood in terms of an open-ended synthesis of several disciplinary approaches" [13].

Furthermore, one hallmark of the culture of globalization is an emphasis on "the hybrid." Jan Nederveen Pieterse writes that "the overall tendency towards increasing global density and interdependence, or globalization, translates, then, into the pluralization of organizational forms. Structural hybridization and the mélange of diverse modes of organization give rise to a pluralization of forms of cooperation and competition as well as the novel mixed forms of cooperation" [14].

Theorists of such hybridity are generally referring to new economic formations or cross-cultural manifestations of ethnic customs and practices, yet the notion of the hybrid extends as well into education theory. According to Julie Klein, "Hybridization reflects the need to accomplish tasks at the boundaries and in the spaces between systems and subsystems. The idea of interdisciplinary social worlds as hybrid communities combines a number of concepts that originated in different contexts" [15]. And also, "The complexity of problems that professionals face in practice creates a sense of interdisciplinary necessity. Complex problems pull research away from classically framed disciplinary problems. By their very nature they are open ended, multi-dimensional, ambiguous, and unstable" [16].

For Klein and others, therefore, the move toward hybrid models of education is both a symptom of, and a necessary reaction to, the social, political, and cultural climate of the 21st century. In one sense, the sheer amount of information created and distributed by the processes of globalization cannot be absorbed or contained or treated adequately within the traditional parameters of disciplinary boxes. In another sense, the complexity and interconnectedness of a globalized planet requires the reconfiguration of knowledge regimes into interdisciplinary categories in order to better combat global problems.

Certainly, interdisciplinarity has its critics, and there are many obstacles that may impede such educational reform. First, from one perspective, much interdisciplinary work lacks depth and rigor: a focus on breadth at the expense of depth leads to accusations of practitioners lacking the requisite and valued knowledge within a given field. Second, funding in academia flow generally flows along disciplinary lines and to trouble these lines may risk certain revenue streams. Third, even those teachers and scholars who are excited about the possibility of interdisciplinary studies may feel constrained by retention, tenure, and promotion strictures which weren't written with their objectives in mind. Finally (and ironically), interdisciplinary research areas are strongly motivated to become disciplines themselves – as interdisciplinary studies strive for legitimacy they often undermine the very ideological and intellectual drives that brought them into being. For example, "Women's Studies," "Cybernetics," and "Biomedical Engineering" all started out as interdisciplinary ventures that have been codified into disciplines in their own right, and other areas, such as "Astrobiology," "Digital Media Studies" (drawing from Art, Computer Science and Journalism), and "Industrial Ecology" (combining experts from the fields of environmental studies, economics, and technology), are in various stages of disciplinary formalization.

Yet despite these (admittedly valid) concerns, there is still an overwhelming need to push forward the importance and usefulness of interdisciplinarity. As Robert Froderman and Carl Mitcham make clear in their defense against attacks of superficiality, too often disciplines become overly specialized. While "interdisciplinary efforts are often characterized as shallow, this is true only in comparison with the 'stove-pipe' narrowness of depth in disciplinary detail and specialization. Moreover, no epistemological justification is offered for why we should prioritize the vertical as compared with the horizontal dimensions of the knowledge. In what sense does a Ph.D know something more or more valuable than a person with three Master's Degrees? As important as disciplinary depth is knowledge of the over-all topographic landscape of human affairs." [17].

The need for a more inclusive knowledge base – to privilege breadth over depth – takes on a more significant valence within those interdisciplinary programs which aren't necessarily formed in response to emergent technological or economic opportunities but rather when they are created to address certain social, political, or environmental problems. To return to the proposal advanced by Mark Taylor as addressed in my Introduction, a radical move to make education more effective and pragmatic would be to "abolish permanent departments, even for undergraduate education, and create problem-focused programs" [18]. Such problem-focused programs already in existence would include the Climate Change Studies Program at the University of North Texas (made up of geologists, philosophers, public planners); Peace and Conflict Studies Programs at several institutions (incorporating faculty from International Relations, Sociology, Psychology, and Anthropology); and AIDS Studies at the University of California, San Francisco (which bring medical technicians into conversation with geo-political scientists and ethicists).

Also, unique and pertinent to these "problem-focused" programs is the affiliations between the traditional academy and those in professional fields. In a sense, this is another dimension or plane to interdisciplinary studies – not only drawing on several academic fields but actually utilizing the knowledge and practice of professionals in the field. The vision of the Center for the Study of Interdisciplinarity makes this clear: "Interdisciplinarity is most often called upon as the best means of solving real-world problems. Yet, real-world problems require scientists, humanists, and educators to work not only with other academics, but also with members of the public and private sectors - decision makers, NGOs, and stakeholders groups. We call this "field academics" to emphasize the importance of taking academic knowledge into settings where its ideas are tested by real-world challenges" [19].

Certainly, if knowledge is to be useful is must do more than migrate and evolve from one campus building to another. It must be placed in dialogue with a number of stakeholders from the public and private sectors. Put another way, in the words of Frodeman and Mitcham, "contemporary knowledge production should involve not only a horizontal axis stretching across academia but also a vertical axis where academic research is integrated into contemporary life" [20].

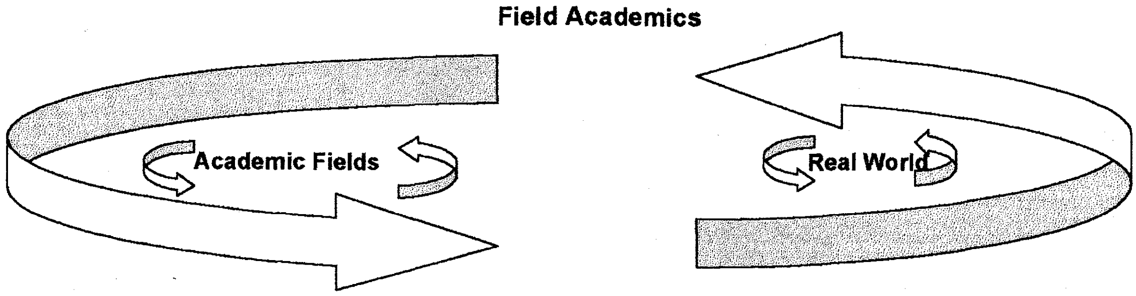


Fig. 1. Center for the Study of Interdisciplinarity [http://www.csid.unt.edu/research]

5. INTERDISCIPLINARITY AND MET

To re-think interdisciplinary programs along axes of "problems" instead of traditional boundaries of academic disciplines is to come full circle to the words of Sasakawa with which I began this paper when he called for a "new problem-solving process" to tackle complex maritime issues. Further in his speech he asserts: "We need to develop a new systematic, integrated curriculum. One that includes comprehensive education about the sea. One that encompasses such fields as marine environment, maritime administration and policy, international law and safety management. This new curriculum will play a key role in developing a new maritime community" [21].

Certainly, some such related curricula exist. In the U.S. alone, there are dozens of Maritime Studies Programs: at the University of Connecticut, students explore humankind's critical and continually evolving connections with the world's waterways and watersheds, and maritime issues are lensed through interdisciplinary courses from economics, English, political science and anthropology with the understanding that successful graduates – through access to hand-on experiences with maritime culture and commerce – will pursue careers in maritime industries, port and harbor management, coastal conservation groups, and maritime museums and aquariums. In the Maritime Studies department at Texas A&M at Galveston, students take several courses in anthropology, biology, history and specialized coursework in international maritime culture, history of American seapower, literature of the sea, and nautical archeology. Numerous other schools – the University of West Florida, East Carolina University, Tufts University (to list just a few) – have Maritime Studies Programs that draw on a variety of inter-related disciplines.

Thus far, this essay has concentrated for the most part on interdisciplinarity on the macro level – how it might function in larger educational institutions or those with more comprehensive programs. Maritime Education and Training, however, by its very nature is more narrowly defined. Indeed, those programs that have traditionally defined maritime academies – marine transportation and marine engineering – are professional programs which train cadets for a very specific career with equally course objectives. Constraints on resources (both human and financial), on unit load caps, and years-to-graduate expectations severely hamper many ambitions for interdisciplinarity.

At the California Maritime Academy, which is a campus of the California State University System, we are continuously defined (internally and externally) as a "specialized" campus, as a "niche" school, and one which has a very specific and programmatic focus. Many of our fellow institutions in IAMU have similar status. How, then, to bring interdisciplinarity to bear on MET? Is such a thing possible? Or desirable? How do very regimented regulatory bodies and accreditation bodies limit interdisciplinarity? Given the pressures to graduate licensed cadets in a short amount of time with the appropriate allotted sea time and devotion to STCW and other national Coast Guard requirements, how do we accomplish this?

6. INTERDISCIPLINARITY AND THE CALIFORNIA MARITIME ACADEMY

The California Maritime Academy is now actively pursuing interdisciplinary education in several different arenas. As Cal Maritime seeks to become a maritime university providing education, training, experience and expertise in all things maritime, towards that objective all departments are encouraged to create more interdisciplinary content in courses and to work in concert to assure that the multidisciplinary educational needs of students are met. A recent draft of our Academic Master Plan acknowledges that the links between business, science, technology and policy are apparent in the professional world, yet some academic institutions have appeared reluctant in the past to create courses that illustrate these connections and to bridge departmental divides. Our educational system, professional workforce and society may be seeing the consequences of ignoring these connections, and therefore the creation of interdisciplinary and interdepartmental connections across the curriculum should enrich students' educational experiences.

Some interdisciplinary objectives include considering the feasibility of developing a hybrid degree program between the departments of Maritime Policy and Management and Marine Transportation which would allow for an unlicensed option for students who desire shore-side employment in ports and terminals; developing a bachelor's degree program in Renewable Energy; developing a bachelor's degree in Coastal and Environmental Science; and completing the development and implementation of a Master's of Science in Engineering and Transportation Management Degree. All of these possibilities for growth are by their very nature interdisciplinary, drawing faculty and resources from several different departments in the hopes that a pooling of heterogeneous knowledges and perspectives will contribute to the intellectual and practical advancements of these ventures.

Additionally, within the newly-created ABS School of Maritime Policy and Management – dedicated to the issues of global maritime policy, environmental and social responsibility, international business, management and communications – undergraduate courses are offered in international business, supply chain management, maritime environmental issues, maritime and energy policy issues, port and terminal management, humanitarian logistics and relief chain management, maritime history; maritime culture, and marine finance and insurance. Such a plethora of networked courses housed together may work towards Sasakawa's call for maritime responsibility in a comprehensive and cross-disciplinary manner. Furthermore, within this interdisciplinary school we have three divisions with permeable borders, and each division is itself interdisciplinary in form and function.

First, the department of Global Studies and Maritime Affairs provides students with a solid theoretical grounding in the social sciences which are applied to the needs of the greater maritime and transportation industries. Also important to this degree is applied knowledge relevant to government agencies, non-profit organizations, international organizations and businesses dealing with maritime issues with a concomitant foundation in economic and political globalization theories and the theories of the policy processes as well as an understanding of global maritime history and an awareness of current global maritime issues as they relate to security, trade and the environment.

The International Business and Logistics major, also housed with the Maritime Policy and Management School, is an interdisciplinary degree that provides opportunities for students to gain essential skills in various aspects of international business, logistics, and supply chain management. The opportunities available to students from increasing international trade emphasize the continuing need for professionally trained individuals who can work in diverse areas of global transport management, outbound and inbound operations management, inventory planning, sales and order management, demand forecasting, customer service, and information management functions.

The third pillar of this department is the division of Culture and Communications, which houses Cal Maritime's Writing Program, foreign language offerings, and courses that are traditionally housed within humanities and arts departments. This division understands that in an increasingly interconnected and globalized world with complex flow of material and information, it is important to communicate and to understand culturally-motivated dynamics as they impact the myriad maritime industries and related activities. To be successful and prosperous citizens in today's world, students must learn to understand other cultures, whether through speaking a foreign language or studying another culture's literature, beliefs, arts, and institutions. The objectives of this division, therefore, include an interdisciplinary commitment to cultural awareness and an ability to communicate effectively across boundaries which must necessarily be fused with ethics to create a sense of oneself in the world.

The use-value of such an embedded hyper-interdisciplinary mode may be demonstrated, for example, in the case of modern international piracy. Besides relying on the expertise of maritime political scientists, the nascent field of Piracy Studies almost insists upon an interdisciplinary configuration of academics and national and international governmental agencies with input from fields as diverse as history, international relations, cultural studies, geography, maritime security, poverty studies, etc.

In another example of interdisciplinarity in praxis, in the spring of 2009 the California Maritime Academy inaugurated a campus-wide exercise in applied learning. Utilizing multiple simulators, a terrorist attack scenario was developed wherein a small craft loaded with explosives strikes an oil tanker in San Francisco Bay, causing significant but not crippling damage. The scenario was then complicated with incoming threats of another incident which require the damaged tanker to be moved, and reports of toxic gas releases at the Port of Oakland, a fire on Yerba Buena Island and closure of the Bay Bridge added to the confusion and realism of the exercise. Students were divided into various teams focusing on terrorist intelligence, business and economic impact analysis, environmental monitoring of spilled petroleum, incident response operations, and media relations. Deck and engineering students 'operated' the tanker, and a responding tugboat and Coast Guard cutter sent to the scene, and worked to restore the tanker's engineering functions. The planning team maintained realism by continually feeding new information to each of the student groups. Interim Dean of Simulation Captain Jim Buckley, speaking of the drill's objectives, claimed that the "cadets gained a better appreciation for each other's knowledge, and how deeply inter-linked their skills and knowledge are in the realm of maritime operations, business, policy, environment, law and public understanding" [22]. This is the type of synergy that interdisciplinary training can develop and foster on an undergraduate level and which maritime education should embrace.

The above delineation of Cal Maritime's new and proposed programs and exercises is not intended to simply enumerate the multiple opportunities available to maritime universities; rather, I wanted to show how this particular institution is committed to an interdisciplinary enterprise. We are still in uncharted waters, but I would like to suggest that the field of maritime studies is ripe for the very kinds of curricular reforms that other institutions around the world are embracing. There is much, I believe, that maritime academies can learn from other institutions of higher learning which have already begun to deeply embed interdisciplinary projects across curriculums. Conversely, I also believe that the very nature of the maritime environment and the possibilities inherent in the ways we approach this environment and its challenges and opportunities may prove to advance the cause of interdisciplinarity itself; that is, we can contribute to interdisciplinary studies as much as we can learn from it.

7. CONCLUSION

Interdisciplinarity is not just a way of teaching, it's a way of thinking; knowledge regimes too rigidly constructed don't effectively enable critical and analytical processes. Interdisciplinarity better lends itself to address today's complex problems. In this way, it is akin to the very work that we as educators in maritime education and training are specifically designed to do: to cross boundaries – to overcome the barriers, to reach different shores. Utilizing metaphors we may all be familiar with, Frodeman and Mitcham argue that while traditional disciplinary demarcations have been productive, these "islands" of knowledge are threatened by "both informational and political floods. Attempts to build or rebuild levees to preserve pure research in isolation from epistemological, political and metaphysical exigencies are unlikely to succeed for long," and "an alternative system of dikes and outlets may help us to simultaneously preserve and connect the multiple island with their rich cognitive diversity" [23] To push the metaphors of fluidity and motion further, these theorists align the need for interdisciplinarity with the way our 21st century students access most of their information, their entertainment, and the knowledge of the world; that is, through the world wide web. There is a connection, they argue, between the structure of the internet and the philosophy of interdisciplinarity. Hotlinks radiating in all directions stand in for the eradication of disciplinary boundaries:

> "Surfing has been dismissed as a distracted, superficial and indolent activity in contrast with the serious, sustained focus of traditional learning. But in an age of chronic overinformation, knowledge consumers must learn how to perform information triage. Might there not be a form of interdisciplinarity that complements the advancement of disciplinarity by circumscribing disciplinarity, assisting both producers and users of knowledge to draw insights from constrained disciplinary formations? Might there not be a type of interdisciplinarity that trains us to take quick dips into bodies of knowledge, extracting the knowledge necessary for particular circumstances, without becoming hostage to the incitements of surfing – disciplining our desires as well as our epistemological methods? [24].

To match the fluidity of the seas to the fluidity of the industry with the fluidity of our educational structures requires a tremendous amount of work, yet to open the bottlenecks and clear the channels between previously self-contained subject areas will ultimately place our graduates in a better position to weather the times ahead.

References

[1] Sasakawa, Yohei. Statement for the Call for Papers, IAMU AGA 10.

[2] Sasakawa, Yohei. "Development of a New World Maritime Community" Speech Delivered at the 7th General Assembly of the International Association of Maritime Universities, Dalian Maritime University, Dalian, People's Republic of China. October 16th, 2006.

[3] Taylor, Mark C. "End of the University as We Know It." Op-Ed. The New York Times. April 27th, 2009. Retrieved from: http://www.nytimes.com/2009/04/27/opinion/27taylor.html, p. 1.

[4] "Reinventing Undergraduate Education: A Blueprint for America's Research Universities." The Boyer Commission on Educating Undergraduates in the Research University. 1995, p. 23.

[5] Davies, Martin and Marcia Devlin. "Interdisciplinary Higher Education: Implications for Teaching and Learning." Center for the Study of Higher Education. The University of Melbourne, 2007. Retrieved from: http://www.cshe.unimelb.edu.au, p. 3.

[6] Davies, Martin and Marcia Devlin. "Interdisciplinary Higher Education: Implications for Teaching and Learning." Center for the Study of Higher Education. The University of Melbourne, 2007. Retrieved from: http://www.cshe.unimelb.edu.au, p. 3.

[7] "The Bologna Process 2020 – The European Higher Education Area in the New Decade. Communique of the Conference of the European Ministers Responsible for Higher Education. Leuven and Louvain-la-Neuve. 28 – 29 April, 2009, p. 4.

[8] Kocklemans, Josesph J. *Interdisciplinarity and Higher Education*. Penn State Press, 1979. p. 352.

[9] Devlin, M. "An international and interdisciplinary approach to curriculum: The Melbourne (2008). Model" Keynote address at the Universitas 21 Conference, Glasgow University, Scotland, 21 – 22 February, 2009, p. 3.

[10] Hackett, Edward. "The Prospect for Interdisciplinary Studies of Science, Technology, and Society in Japan." National Science Foundation. Special Report #97-07, p. 3.

[11] Keio University. http://www.keio.ac.jp/english/academics/faculties/sfc.html.

[12] Tomlinson, John. *Globalization and Culture*. Chicago: The University of Chicago Press, 1999. p. 13.

[13] Pieterse, Jan Nederveen. *Globalization and Culture: Global Mélange*. Lanham: Rowman & Littlefield, Publishers, 2004, p. 61.

[14] Pieterse, Jan Nederveen. *Globalization and Culture: Global Mélange*. Lanham: Rowman & Littlefield, Publishers, 2004, p. 63.

[15] Klein, Julie Thompson. *Crossing Boundaries: Knowledge, Disciplinarities, and Interdisciplinarities.* Charlottesville: University Press of Virginia, 1996, p. 22.

[16] Klein, Julie Thompson. *Crossing Boundaries: Knowledge, Disciplinarities, and Interdisciplinarities.* Charlottesville: University Press of Virginia, 1996, p. 22.

[17] Frodeman, R. and Mitcham, C. "New directions in interdisciplinarity: broad, deep, and critical." Bulletin of Science, Technology & Society. Vol 27, No. 6 December 2007, p. 508.

[18] Taylor, Mark C. "End of the University as We Know It." Op-Ed. The New York Times. April 27th, 2009. Retrieved from: http://www.nytimes.com/2009/04/27/opinion/27taylor.html, p. 1.

[19] Center for the Study of Interdisciplinarity. http://www.csid.unt.edu/research/.

[20] Frodeman, R. and Mitcham, C. "New directions in interdisciplinarity: broad, deep, and critical." Bulletin of Science, Technology & Society. Vol 27, No. 6 December 2007, p. 510.

[21] Sasakawa, Yohei. "Development of a New World Maritime Community" Speech Delivered at the 7th General Assembly of the International Association of Maritime Universities, Dalian Maritime University, Dalian, People's Republic of China. October 16th, 2006.

[22] Webster, Doug. Currents. May, 2009 Vol. 5 No. 5. http://www.csum.edu/documents/CURRENTSMAY09.pdf , p. 3.

[23] Frodeman, R. and Mitcham, C. "New directions in interdisciplinarity: broad, deep, and critical." Bulletin of Science, Technology & Society. Vol 27, No. 6 December 2007, p. 512.

[24] Frodeman, R. and Mitcham, C. "New directions in interdisciplinarity: broad, deep, and critical." Bulletin of Science, Technology & Society. Vol 27, No. 6 December 2007, p. 508.

RECENT DEVELOPMENTS AND PROBABLE FUTURE SCENARIOS CONCERNING SEAFARER LABOUR MARKETS

Maria Anne Wagtmann,
PhD
René Taudal Poulsen,
PhD
University of Southern Denmark
E-mail: maw@sam.sdu.dk

Abstract. During the past 25 years, demand for seafarers has changed a great deal, due to the creation of second registers in Western Europe as well as ship register adjustments in other flag states. Concurrently, supply patterns have shifted, with new supply centres emerging in especially Asia and Eastern Europe. In contrast, the supply of officers from OECD countries and especially the demand for ratings from these countries have dwindled. On this basis, key factors that have influenced the supply and demand of seafarers during this period are identified. After this, this paper looks at future challenges for the maritime industries. In connection with this, the following issues are covered: the age and nationality structure of the coming seafaring workforce, future scenarios concerning the provision of seafaring education, and possible future reorganisation of broader shore-based maritime labour between nations, seen in the light of the seafaring labour market situation and education issues. In the paper, distinctions between OECD, transition economy and developing countries are made, when relevant.

1. OVERVIEW OVER SEAFARING LABOUR MARKET DEVELOPMENTS IN PAST 25 YEARS

1.1. The demand for seafarers

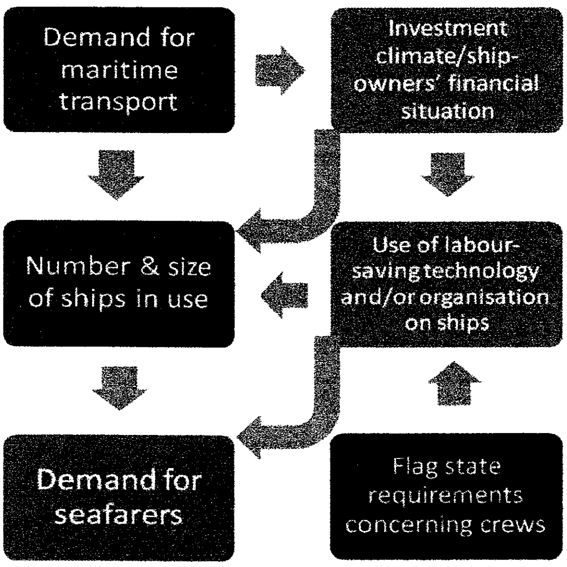


Fig. 1. Global Demand for Seafarers

Globally, approximately 1.2 million people are employed at sea, manning the world's merchant fleet. In comparison, approximately 4 million people are directly employed in the car manufacturing industry. However, the maritime labour force has a crucial importance to the world economy, transporting the vast part of global trade from supplier to consumer. Hence, its development and efficiency plays a key role in the future of global trade.

Total global demand for seafarers is derived from total global demand for maritime transport as well as influenced by financial sector, regulatory and technological changes, as indicated in Fig. 1. Here, the investment climate as well as flag state regulations directly influence the use of labour saving technology (with the corresponding reorganisation) on board ship, whereas individual flag states may have regulations that either enable or prohibit such reorganisation. Moreover, the investment climate and, more immediately, the current demand for maritime transport, influence the number and size of ships in use, which then most directly influences current demand for seafarers.

Over the last five decades, demand for maritime transport has increased more rapidly than global production due to a very rapid increase in global trade. From the early 1960s to the present, total maritime transport has increased from 0.5 to 3.0 trillion ton-miles cargo (Stopford [68]). Only two periods deviate from this overall growth trend: 1973 – 85 and 2008-09; during these two periods total demand in important maritime sectors contracted.

In order to satisfy growing demand, shipowners have improved efficiency in their fleets. Average tanker and bulker vessel sizes soared from the 1950s to the 1970s, and average sizes of container carriers and special carriers have grown rapidly since then. Also automation of work at sea has caused maritime labour productivity to increase. Thus the number of seafarers required to transport a given cargo has been reduced, yet overall growth in the world merchant fleet has caused total demand for seafarers to remain relatively stable from the 1980's to the present, at around 1.2 million seafarers (see Fig. 2).

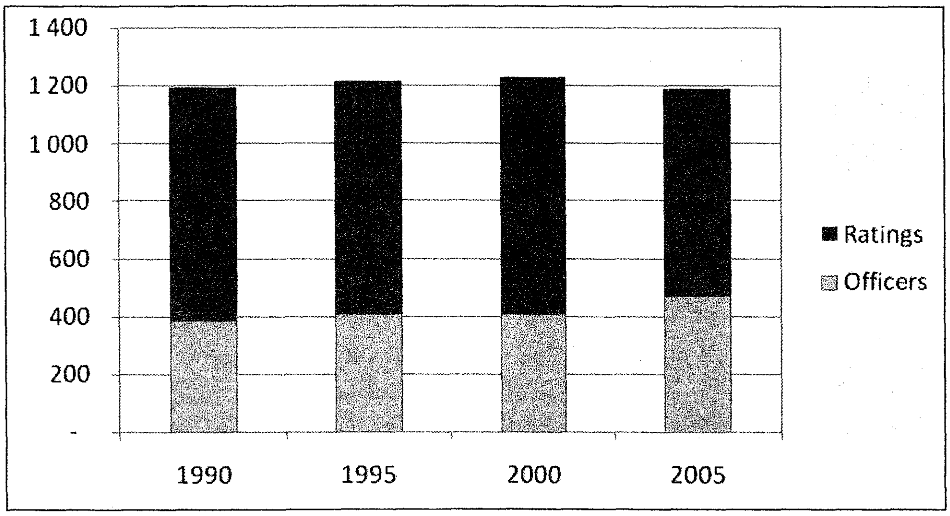


Fig. 2. Employment of ratings and officers, 1990-2005 (BIMCO/ISF [5, 6, 7, 8])

Shipowners either chose to crew and manage their ships themselves or to delegate some or all of these responsibilities to ship or crew management firms. Regardless of whether management is taken care of in house or delegated to external parties, shipowners usually retain control of the flag states used to register their ships (Mitrossi [54]). In addition to flag state requirements concerning minimum crew requirements, as discussed in connection with Fig. 1, various flag states have requirements about crew nationality and/or qualifications, which influence the countries from which ship owning companies or their chosen ship managing or crew managing firms may chose crew. In relation to the selection of the crew, there is also evidence that shipowners seek to retain control of the nationalities of the crew (ibid).

However shipowners are not to be prone reregister their vessels for crew cost reasons alone, as Ready [60] and Willingale [75] do not rank labour cost factors are being the most important cost factors in flag state choice in the current global shipping regime. Still, shipowners' flag state choices have a direct impact on the global maritime labour market, and changes to third country 'open registries' with fewer labour market restrictions have caused demand for seafarers to shift from OECD to Asia and Eastern Europe over the last four decades (Stopford [68]).

In response to 'flagging out', several Western European countries established second registries in the late 1980's, which encompassed a tonnage tax system and allowed European ship owners to employ non-EU/EEA seafarers at lower, home country wages. While the second registries from some European countries, e.g. Norway and more recently Denmark, have succeeded in attracting tonnage, the open registries have also continued to grow. Thus both open and second registries have facilitated the shift in demand for seafarers, including less demand for OECD country ratings. Historically, OECD country labour unions have protested against open registries, arguing that these allow shipowners to compromise safety and neglect social responsibilities, and some second registries were also met with this union stance (Klikauer & Morris [36]). The cost/quality dilemma is usually present for shipowners, yet crewing costs are still an important percentage of total operation costs (Llácer [42]) on all but the largest ships. Thus shipowners generally chose to minimise wage costs, so that the 1999 global average rating wage was only roughly ¾ of 1992 wages (Bloor, Thomas & Lane [10]). However, quality of labour is not directly related to nationality; it depends on training, experience and competences.

1.2. The supply of seafarers

As indicated in Fig. 3, the supply of seafarers from each nation is in part derived from the general labour market conditions in this nation, which, in turn are influenced also by demand conditions at the global and national level, as discussed in the previous subsection.

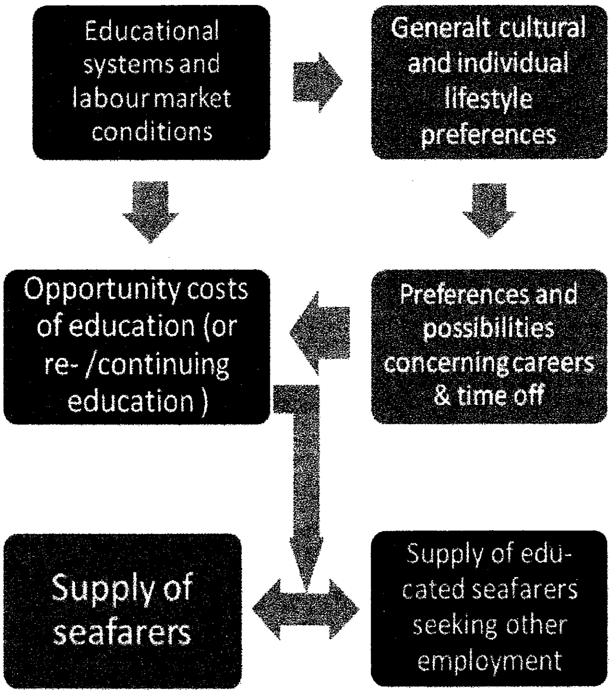


Fig. 3. National supply of seafarers

Fig. 3 indicates that the features of the national and other accessible educational systems (e.g. the cost of education and the possibilities of financial support for studies) as well as the local labour market conditions (e.g. expected wage levels if one completes a certain course of study) influence the opportunity costs of taking part in a particular course of study. Moreover, general cultural patterns in the country in question (e.g. the role of males and females in relation to taking care of children and/or elderly parents) and the individual's lifestyle choices influence the individual's preferences for careers and time-off, in relation to the local collection of career and time off-possibilities. These factors in turn also influence the individual's more subjective opportunity cost function.

However, even if the individual chooses to get education which qualifies him/her to work as a seafarer, this does not necessarily mean that s/he will enter into the seafaring profession at all or remain at sea long, for in many countries there are ample possibilities for finding shore-based employment for persons with seafaring education, and Haralambides [30] indicates that employment ashore is generally preferred to employment at sea. Based on these remarks, shifts of supply between world regions are depicted in Figures 4 and 5 below.

From Fig. 4 and 5, the relative decline in the OECD labour force is clearly evident both for ratings and officers, as is the growth in the supply from the Far East, the Indian subcontinent and Eastern Europe, areas where there generally are greater land-based job market failure problems (Wu & Morris [76]). Moreover, the shifts in supply reflect political changes in, e.g., Eastern Europe (BIMCO/ISF [6]) and China (Wu & Morris [76]). Figures 4 & 5 gives no indication as to the level of training and education, but the new supply centres of maritime labour have focused measurably on the training of seafarers (Sampson [62], Yamamoto [78]), an issue we will return to in Section 3. The historical decline in the supply of OECD country seafarers was not only caused by the emergence of new, cheap supply centres elsewhere; it was also partly attributable to the pull from alternative occupations in other land-based sectors, based on the aforementioned general preference among seafarers for shore-based work (Haralambides [30]).

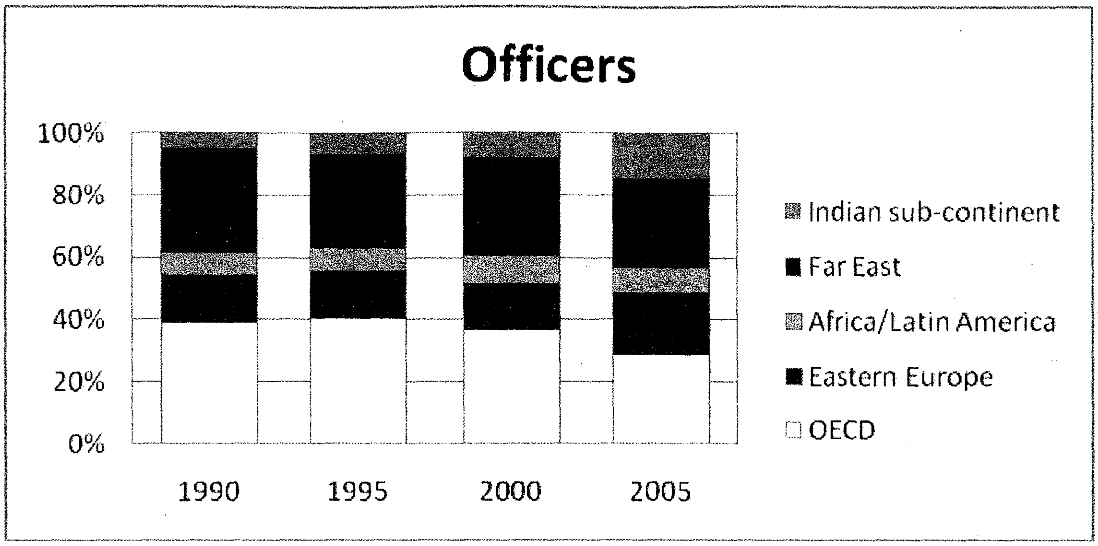


Fig. 4. Supply of officers, by region, in 1990, 1995, 2000 & 2005 (BIMCO/ISF[5, 6, 7, 8])

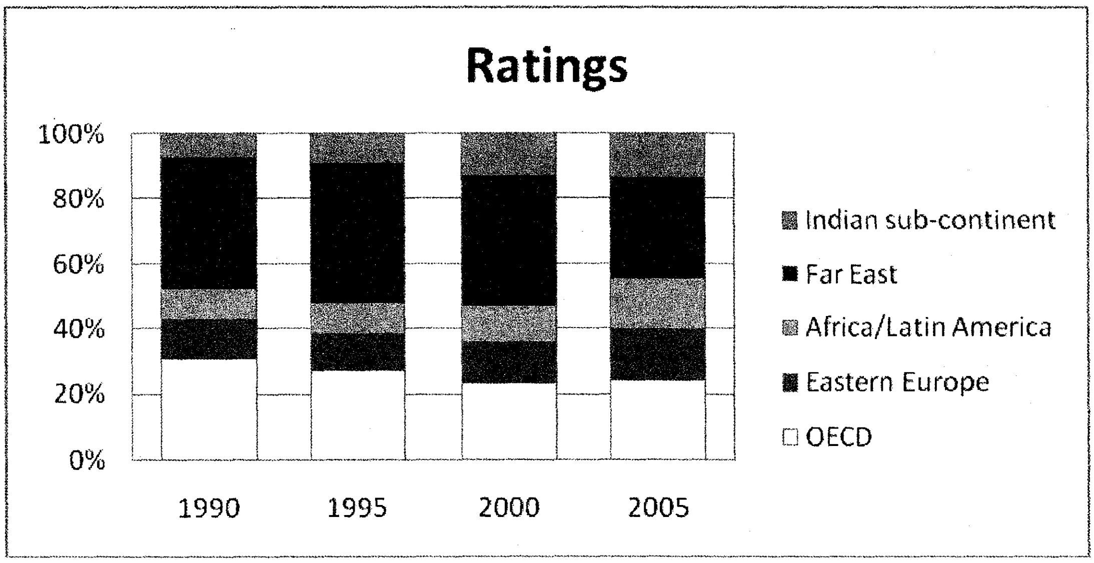


Fig. 5. Supply of ratings, by region, 1990, 1995, 2000 & 2005 (BIMCO/ISF [5, 6, 7, 8])

Several European studies indicate that Western European seafarers have embarked on a career ashore in their home countries after just a few year at sea, due to the possibilities that they have for this either in their home country maritime clusters (EU Commission, DG Fisheries and Maritime Affairs [22]; Southampton Solent University [67]) or in other sectors (see, e.g. Danish Maritime Authority [16]).

2. AGE AND NATIONALITY STRUCTURE OF THE COMING SEAFARING LABOUR FORCE

In 2005, BIMCO/ISF [8] estimated the supply of seafarers from the above regions and made a calculation of excess supply or demand, based on global estimates of supply and demand, as indicated in Table 1 below. In short, the BIMCO/ISF calculations indicated a global surplus of ratings of around 23% and a global shortage of officers of around 2 %, yet it should be noted that any catering and hotel personnel on board ship have been excluded from the calculation.

Table 1

BIMCO/ISF's [8] Seafarer Supply Estimates

Supplying region of domicile	No. Officers	No. Ratings	% Officers	%Ratings
OECD countries	130.000	170.000	43%	57%
Eastern Europe	90.000	119.000	43%	57%
Africa & Latin America	40.000	108.000	27%	73%
Far East	131.000	230.000	36%	64%
Indian sub-continent	75.000	94.000	44%	56%
Total worldwide supply	**466.000**	**721.000**	**39%**	**61%**
Less estimated demand	476.000	586.000	45%	55%
Total surplus or missing supply	**-10.000**	**135.000**	**-2%**	**23%**

Drewry Shipping Consultants [19] makes regular projections of seafaring officer needs over the next 4 – 5 years, based on projected net change in vessels, a factor which as indicated in Fig. 1 very directly and immediately influences the demand for seafarers. In November 2008, they expected to see a net change of 9232 more vessels in 2012, resulting in a demand for 97,032 more officers in 2012. Since the time of the calculation, a huge global recession has set in. We therefore expect a smaller total increase in vessels, due to the contraction of demand in 2008-9. However, we believe that the problem of officer shortage will continue to remain on the short- and medium-term, unless the recession is very long. To explain this, we examine the demographic structure of the industry, however sometimes focusing on the labour market for officers alone, as it is this labour market which is marked by the supply shortage situation.

Table 2

Mean age of officers in various developed, transition & developing countries

Country	Age average	% > 40
Canada	40.3	55.0%
Germany	48.0	78.9%
Italy	40.5	46.4%
Norway	39.8	39.6%
USA	49.4	90.9%
UK	45.7	70.2%
Bulgaria	39.5	40.2%
Croatia	38.6	40.7%
Latvia	39.9	49.7%
Poland	41.2	52.4%
Russia	39.7	49.8%
Ukraine	39.3	48.4%
India	36.4	31.8%
Myamar	≈40	N.A.
Philippines	41.2	57.4%
South Africa	35.8	27.2%

Information about sources:

Glen [26] Ellis & Sampson [20]

Various sources provide information about the age distribution of officers in the commercial fleets of various countries and regions. On this basis, we have compiled Table 2, which depicts the mean ages of seafaring officers of all ranks and the percentage of officers over 40. Of the included OECD countries in Table 2, the ageing problem is worst among the population of US and German officers, yet the former country no longer is a commercial shipping stronghold. Moreover, if one takes Table 2 together with the nationality patterns depicted in Fig. 4 and 5, we can predict that the trend of replacement of OECD country officers by officers from the rest of world will probably continue, at least in the medium term future, as the average age of officers is generally younger in the non-OECD countries.

However, due to the ageing officer labour force in richer countries, some governments have demanded reports on the officer labour supply situation. In the Netherlands, Waals and Veenstra [73] did the initial forecasting work and also compared the Dutch situation to the situation of other developed maritime nations; their work was followed by a total of three labour market reports by Van der Aa et al [72] about the problem. Other governments such as the Danish government (see Danish Maritime Authority [16]) and the UK government (see Department of Transport, UK [18], Gardner et al [25], Glen et al [27]) followed suit. Academic research on labour supply also exists for the case of the developed countries Greece (Tsamourgelis [69]) and Taiwan (Lin et al [41]).

A number of OECD maritime nations have subsequently embarked on programs to improve their officer education programs and student uptake. In few EU countries, e.g. Italy and the United Kingdom, officers have been able to achieve a modest increase in seafaring employment in recent years (Coleman [14]; EU Commission, DG Fisheries and Maritime Affairs [22]), whereas others, such as Germany and Denmark, may be able to do so in the coming years, due to efforts to attract more recruits (Lloyd's List [45] and http://www.worldcareers.dk/Home/Aktuelt/ Nyt%20fra%20Det%20Blaa%20Danmark/Maalet%20er%20naaet.aspx)

However, a solution to the officer recruitment problems of the current OECD maritime labour workforce does not seem easy to find. There are a few empirical studies and academic papers on the issue (e.g. Cahoon & Haugstetter [12]; Danish Centre for Youth Research [15]), yet Coleman [14] notes that many of the claims about the reasons why young Western Europeans are reluctant to go to sea are made on the basis of assertion and inference, meaning that policy recommendations that stem from this debate are not sure to be effective. This can also be said of Australia (see Griffett [28]; Lewarn [40]) and Singapore (Lloyd's Ship Manager [49]).

In contrast, many of the ratings of developed countries feel "frozen out" and ignored by their home country policy makers. Thus it is not surprising that the global transport trade union confederation ITF, in which the developed country maritime unions play a disproportionately large role in relation to total maritime workforce size (Koch-Baumgarten [37]), expressed its content when the International Bargaining Forum (henceforth: IBF) established the 'IBF Developed Economy Rating Funds' in 2007, to 'encourage companies to offer employment to seafarers from traditional maritime nations who had suffered major job losses during the past two decades' (International Bargaining Forum [32]). However, we do not expect that this IBF measure will rectify the marginalization experienced by the OECD country ratings.

Turning now to the transition economies of Eastern Europe, it is generally slightly easier to recruit cadets in their regions due to the aforementioned problem of land-based job market failure (Wu and Morris [76]), although there also is some evidence that this is becoming more difficult in countries such as Poland and Latvia (see, e.g., EU Commission, DG Fisheries and Maritime Affairs [22], Latvian country report, p. 11; Glen [26]). Moreover, in some Eastern European countries (e.g. Estonia and Poland), seafaring employment is generally in decline (ibid, Coleman [14]); this development may probably be at least partially attributed to the lack of critical mass in and/or the decline of the national shipping industry of these countries (EU Commission, DG Fisheries and Maritime Affairs [22]).

In relation to work for domestic versus foreign employers, e.g., Ellis and Sampson [20] indicate that while 37.3 % of all Russian seafarers worked on vessels in the national fleet, the figures for the Ukraine and especially Poland were much lower, at 16.0 % and 0.2 %, respectively, due to the lesser strength of the latter two countries' merchant shipping fleets. However there is also the trend that some Eastern European seafarers shift from the national fleet to an international operator, if such a switch can give them a higher salary (see EU Commission, DG Fisheries and Maritime Affairs [22]). We expect that these tendencies will continue.

Seafarers from Russia and Eastern European countries work predominantly for employers of Western European origin (Wu and Morris [76]); thus a number of Western European shipowners seem prone to recruit officer labour from countries near to them. For the case of the Eastern European seafarers from countries that are now members of the EU, certain issues related to employment have been facilitated for the Western European employers, whereas some restrictions on non-EU nationals exist in a number of EU flag registers. At the same time, for many of the less well-educated Eastern European seafarers, here especially ratings and personnel in contact with passengers on ferries and cruise ships, their employment seems contingent on their salaries not rising too fast. For example, Polish salaries for work at sea for global employers have fallen to a level comparable to salaries for shore-based work in Poland, and some Polish seafarers have also been replaced by seafarers from the developing world (EU Commission, DG Fisheries and Maritime Affairs [22]). We expect that these labour market developments will continue in the near and medium-term future, due to the fundamental cirumstance of a small shortage of officers and a large surplus of ratings, as indicated in Table 1.

Concerning the developing countries, these provide the shipping sector with the large majority of ratings. However, many persons in developing countries leave maritime schools without finishing their studies, due to the poor quality of the education, not being able to find a cadet berth and/or not being able to continue to finance their education (Sampson [62]); thus, there are a huge number of ratings on the world market with some higher-level maritime education. According to Obando-Rojas [55], this results in a huge number of ratings especially in developing or transition economies who are stuck in a vicious cycle: They cannot get employment due to their lack of educational qualifications (and the oversupply of ratings), yet they also cannot improve their qualifications so that they may work as an officer, due to a lack of financial means. We will discuss this problem further in Section 3.

Among the developing countries, those that supply seafarers are traditionally believed to seek to earn additional income by training ratings and officers for the world market. E.g. Egypt and Turkey train officers with the intention of employment in foreign fleets, and in these two countries, there is competition to be admitted to maritime programs because income prospects are better at sea than in shore-based jobs and the reputation of maritime work is higher (Pourzanjani et al [59]). Moreover, the developing countries Philippines and China are the world's largest total suppliers of seafarers (BIMCO/ISF [8], Ellis & Sampson [20], Glen [26]); BIMCO/ISF estimated that the China supplied 122,208 seafarers in 2005 and the Philippines 120,399 (Glen [26]). Aside from the statistics in the Table 1, JICA [35] forecasted the total 2005 supply of seafarers from Egypt at 4680 and the total supply from all of Africa at 24,732.

As concerns mean ages in the developing countries, Table 2 shows that officer mean ages are even lower, with the exception of the Philippines, where the number of persons entering maritime officer training programs has been declining in recent years, an issue we will return to in Section 3. For some of the developing countries, general life expectancy is much lower than in the developed countries and transition economies. However, for many developing labour supplying nations, we cannot to rule out age or non-job related health condition discrimination on the part of some maritime employers (Leggate & McConville [39]; Wagtmann [74]). On the other hand, it is also been observed that a number of Filipino seafarers transfer to the national Filipino fleet after reaching the age of 45, possibly to be closer to their families (Leggate & McConville [39]). Moreover, some seafarers from a variety of developing nations may simply perceive that they have earned better than many of their nationals on shore, and they therefore chose to retire early. Finally, there may also be impenetrable "glass ceilings", as some maritime employers from the developed nations seem to prefer to employ own nationals or own region nationals in senior officer positions (see Ellis & Sampson [20] or I-maritime Consultancy Private Limited [31]), and some EU flags specify that the shipmaster must have EU nationality.

As concerns recruitment in developing countries, for both ratings and officers, finding potential seafarers has also become more difficult in booming regions. For example, certain urban regions of India and

China, which have enjoyed relatively high growth rates, have experienced that the number of potential recruits to seafaring education and jobs has fallen, probably due to the other choices offered to young people in these areas (Lloyd's Ship Manager [47]). In contrast, in China and the Philippines, the main regions supplying seafarers are the poorer rural regions (Zhao & Amante [82]), and this supply is expected to continue as long as opportunities are lacking in these regions. However, Bernhard Schulte

Shipmanagement's CEO Rajaish Bajpaee believes that seafarers from all parts of the developing countries, rural or urban, would take shore-based employment, if given the choice (Hand [29]), meaning that shipowners should consider for the medium- and long-term future how to ensure that they offer sufficiently good conditions to be able to attract labour on ship

For the case of India, the biggest supplier of officers from the developing countries, the taxation situation skews the market: Indians serving in the domestic fleet pay higher taxes and often also earn less in gross wages than Indians in foreign fleets. Thus India faces a national shortage of seafaring officers, due to the fact that its officers are recruited to serve in foreign fleets that can offer better wages and conditions. This has, incidentally, also happened in certain other developing countries with national shipping activities, e.g. Malaysia (Osnin [56]), without the tax skew. In India, this lead the country to ease its ban on the employment of foreign-trained officers (Lloyd's List [44]). Thus it is expected for the medium term future that India and several other developing countries with own national shipping industries will continue to supply officers to the global fleet, while at the same time having to import officers for own fleets.

Certain other developing countries that have not yet experienced high growth, including some of the least developed countries, are seeking to promote their countries as maritime labour suppliers to the world shipping market. In Ghana, maritime lecturer Amanhyia [2] is seeking to leverage what he sees as Ghana's potentials, due to the country's official and teaching language of English and its relatively strong maritime infrastructure. However, he also points out that the skills of marine engineers could also be transferred to other industries, e.g. the Ghanaian petroleum and gas industry, meaning that also here the marine engineers would not necessary stay on board ships long. (This also occurs in other developing maritime nations such as Malaysia, see Osnin [56]). In contrast, Nigeria (Essiet [21]) and Jamaica (Lloyd's List [43]) seem both to be aiming to supply officers who will stay in the profession relatively long.

To sum our age and nation-based predictions for the medium-term future up, we believe that most developed nations will continue to have trouble finding applicants to maritime officer programs, leading to the further ageing of their seafaring labour forces, and that this problem will also spread to some extent to certain Eastern European nations as well as to relatively booming urban areas in certain developing nations. Moreover, we predict that there will continue to be a huge global overabundance of ratings and also a slight deficit in officer labour on the global market, unless the current economic recession is very severe and long-standing – and that the seafaring labour as a whole will increasingly be sourced from developing and transition economy countries with maritime education facilities and land-based job market failure, although some positions (especially as officers) will still be accessible to OECD or EU country residents only.

3. FUTURE SCENARIOS CONCERNING THE PROVISION OF SEAFARING EDUCATION (ALSO CALLED MET)

3.1. The current situation in various world regions

In this section, we will first 'set the scene' by providing an overview of the current situation. Here, we will start with the OECD countries, with the main focus on Western Europe. In recent years, a number of Western European maritime nations have sought to use public moneys to improve MET and other infrastructural conditions, to ensure the future of the maritime sector in their country (Jakobsen et al [34]).

Many of these policies have been framed in the national political debate as reinforcing or ensuring the strength of the "cluster", a term from the well-known work *The Competitive Advantage of Nations* (Porter [58]). In Norway, Porter's concepts were put to use in recommending national industry policy for the maritime sector in Bjørndalen & Reve [9]. After this, a number of other actors in other Western European maritime nations demanded similar national maritime cluster studies and subsequent national maritime cluster policies; also the EU Commission recommended the cluster approach in a 2006 white paper (EU

Commission [23]). Moreover, key aspects of 'maritime clusters' were debated and promoted in a few other OECD nations, e.g. Australia (Griffet [34]).

Based on the above developments and the general high national income level, most MET institutions in Western Europe and the other OECD nations enjoy fortunate circumstances in comparison with their compatriots in the transition economies and the developing world. For the OECD maritime nations, it is a common characteristic that the public sector has sought to varying extents to promote and support the home country shipping firms. However, the extent of public education support has varied from country to country (Mazzarino [51]), with MET programs in some countries (e.g. Canada, Greece, Japan, UK, USA) being financed partially by student fees and in cases of needy students varying amounts of scholarship money from various sources and other countries providing free education with either some need-based living expenses financing for students (e.g. Germany) or living expenses financing for all students (e.g. Denmark and Sweden). Additionally the education-related roles of shipowners or ship and crew management companies have varied somewhat from OECD country to OECD country.

In contrast, most MET institutions in the transition economies and the developing countries are not nearly so well-off in relation to the financing of nautical education (Amante [3]; Barzan [4]; Bonnin et al [11]; Cicek & Er [13]; i-maritime Consultancy Private Limited [31]; JICA [35]; South African Press Association [66]; Uy & Duong [71]; Wu [77]; Yamamoto [78]; Zac et al [81]; Zhao & Amante [82]). However, it is important to note that the shifts in supply and demand described in Section 1 of this paper could not have taken place if developing countries, despite their limited means, had not invested in MET, and if maritime academies in Eastern Europe and Russia had not taken great care to ensure their MET's survival and continued adaptation to global market conditions during and after the difficult transition period.

There has, however, also been concern about varying levels of quality in MET programs around the world; therefore, the International Maritime Organisation (henceforth: IMO) has sought to put forth global standards through, e.g., the STCW 95 Convention and its amendments, including the "white list" of countries said to fulfil the convention, published since 2000. However, this does not mean that only the developing and the transition economy countries have MET quality problems; there are also some MET deficits in developed countries (Islam [33]).

However, a few of nations currently on the white list of the IMO's STCW 95 Convention are alleged to tolerate that some of their home MET institutions offer very substandard training in relation to the STCW demands (Sampson [62]; Short [64]). This claim has been made for the case of certain schools in the Philippines; in connection with this, it has also been suggested that it probably was not politically expedient to the world maritime community to exclude the Philippines as the largest seafarer supply country to the world market over the past decades from the IMO's white list, meaning that the deviant MET institutions were in essence indirectly allowed to continue such irresponsible behaviour (Sampson [62]). In relation to this, Sampson [62] has also focused on economic aspects of the current global governance of MET – or lack thereof, as, e.g. Yamamoto [78] has argued. Fig. 6 seeks to illustrate her argument that mandatory further private investment is necessary toward the goal of ensuring that institutions in low and medium income countries can provide sufficient quality in MET. Especially the newer need to invest in sophisticated and expensive training equipment such as simulators has worsened the finance crisis of MET institutions in the middle and low income countries, and such investments have often been made to the detriment of equally necessary investments in staff qualifications (Cicek & Er [13]; Sampson [62], Short [64]). In such systems, Yamamoto [78] and Zac et al [81] note that due to the wish to achieve a source of income and/or to insufficient governmental support, a number MET institutions in developing countries or transition economies adhere to a policy of merely seeking to fulfil a bare minimum of skills, experience and competency, meaning that mere regulation attempts via certification systems is insufficient in itself to ensure a global level of quality.

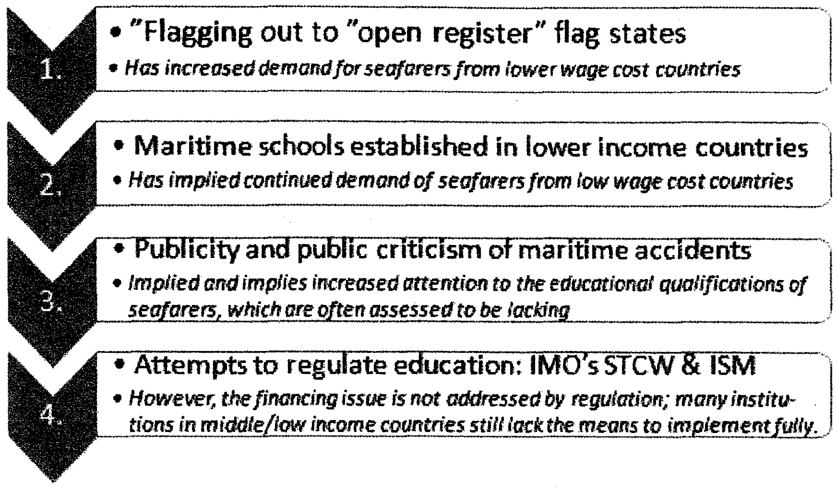


Fig. 6. An overview of events leading to the current state of global maritime education (after Sampson [62])

This is, however, not mean that there are not excellent MET institutions in developing or transitional economies. Of course there are - and that in a plethora of countries. E.g. in St. Petersburg, Russia, the Admiral Makarov State Marine Academy is a renowned institution that meets the needs of the global community and of local stakeholders (Kostylev [38]), and in its closest neighbouring country, the Estonian Maritime Academy has been very successful in research and educational cooperation with industry (Yilmaz et al [79]). Also in India, there are some first class institutions, in both the public and private sector, yet other institutions in both sectors are marked by quality problems (i-maritime Consultancy Private Limited [31]).

The Philippines is perhaps the country that is marked by the greatest variation in quality. On one hand, the country is the developing country which has received the large amount of non-state sector support for MET, which has come from a multitude of individual shipping companies, national shipowners' associations from countries such as Japan, Norway and Netherlands, and even the ITF (Hand [29]). On the other hand, many of the country's MET institutions, including especially those who have received little or no support, are marked by huge quality problems. According to Amante [3], before 1991, less than 50 % of maritime engineering and only around 40 % of the navigation officer graduates were able to pass the officer license examinations, and this situation has not improved at a number of Filipino maritime schools. Therefore, it is not surprising that the Philippine Commission on Higher Education reports a decreasing trend in the graduates of officer level courses, as previously mentioned in Section 3: In 1997, there were 15,754 graduates, which decreased to a mere 3,667 graduates in 2004.

In the above, we have mainly focused on officer training. However, for developing and transition economy countries that are seeking to improve ratings training, there is South African evidence (Bonnin et al [11]) that countries and educational institutions seeking to improve ratings training are faced with even more difficult financing circumstances, due to the oversupply of ratings on the world market, which leads to hyper-competition on a low cost basis and even less changes for achieving industry support for such training.

3.2. The short-and medium-term future scenario for MET

For the short- and medium-term future, we expect to see debate about the future of MET in the OECD countries. On one hand, as indicated, some OECD governments have investigated huge sums in MET, and therefore various stakeholders may want to continue such investment. Moreover, the slight global shortage of officers may also make the OECD countries more prone to continue to invest in MET. On the other hand, there is the problem of recruitment. Thus other voices such as Ruhallah [61, p. 28] state that "the industry should be focused on training, recruitment and retention of seafarers from developing countries. Any recruitment drive in maritime nations is unlikely, given the economic and social expectations of young people in advanced countries, to be successful." More radically, Pourzanjani et al [59] ask why Western Europeans do not fully outsource maritime education and training to other countries.

Concerning developing and transition economy countries, some academics and business actors advocate a firm or firm coalition-specific model for labour supply chain management, from education to retention issues, via firm-specific investments through, e.g., manning agents (see, e.g., Ruhallah [61]). Liberalists would tend to prefer such a system, and other persons with less optimistic views of various public sectors' capabilities of playing the leading role in solving maritime education problems also in the case of more favourable public sector financial circumstances also adhere to this opinion. For example, the Philippine manning industry, on the basis of the impressive results of Norwegian and Japanese investments in seafaring education in the country, would like to attract similar investments from other shipowners (Lloyd's List [46]).

However, there is still a large segment of the global maritime industry that views investment in seafarers' education as an exclusive public sector responsibility and is loath to contribute (Lloyd's Ship Manager [50], Short [64]). Due to this lack of broad industry interest, we expect to see only moderately increased growth in these types of arrangements on the short- and medium-term future, and we do not believe that all institutions in developing and transitional economies will be able to provide quality MET in the near future. Still, from around 2005 to 2008, the tendency seems to have been that more and more maritime schools in developing and transition economies were contacted by shipowners (see, e.g., Barzan [4]), due to the shortage of seafarers. Also InterManager has begun from 2008 to require of its members that they adapt a formal cadet programming offering at least one cadetship per ship under full management by the member in question (Lloyd's Ship Manager [48]). Here, it is our impression, based on conversations with industry stakeholders and various contributions in the global maritime press and information network, that most shipowners, ship management and crew management firms that have decided to invest in officer education are not likely to pull out of their investments completely due to the recession, as they perceive that there will be a need for more officers after the recession. On the part of the developing and transition economies, we believe that such retention and commitment strategies are welcomed, provided of course that the investors from the shipping industry adhere to basal ethical rules concerning MET, as they in most cases do.

4. FUTURE LAND-BASED INTER-COUNTRY REORGANISATION ISSUES IN MARITIME LABOUR MARKETS

In relation to the cluster policy efforts of the "traditional" European maritime nations, as described at the beginning of Subsection 3.1, there is a fundamental dilemma, which also concerns other OECD maritime nations such as Japan (Nishikawa 2002), Australia (Lewarn [40]) and Singapore (Danish Maritime Authority [17]) as well as the Hong Kong Special Administrative District of China (Zarach [80]): On one hand, land-based maritime industry positions have traditionally been filled by former seafarers who are believed to possess superior and/or unique skills in relation to these positions (Danish Maritime Authority [16], Gardner et al [25], Lewarn [40], McConville & Glen [52], Pettit et al [57], Southampton Solent University [67]). On the other, works such as Haralambides [30], Lloyd's Ship Manager [50], Ruhallah [61] and Wu & Morris [76] indicates employment ashore is generally preferred to employment at sea and thus that land-based job market failure contributes to the propensity of young adults to seek employment at sea, as also mentioned previously in multiple subsections of this paper.

Both points taken together might in the worst case result in OECD maritime nations/districts not being able to educate and train enough seafarers to maintain their shore-based maritime industries. In this circumstance, Fig. 7 indicates three possible ways in which the domestic maritime industries and society at whole in a country may respond to this problem. The Scenario 1 approach of developing new, land-based educational programs that provide land-based staff with many of the qualifications that were traditionally acquired through former officer-staff members' work experience at sea has been followed by some maritime sector firms in especially the Northern European countries of Germany and Norway (and to some extent the Netherlands), and it is marked with grey green as it would ensure maritime positions on land, yet in the case of maritime accidents, it may also be potentially questioned in public debate if e.g. accident analysis shows that some of the factors that led to the accident situation could be attributed to land-based mistakes by personnel without experience on board ships.

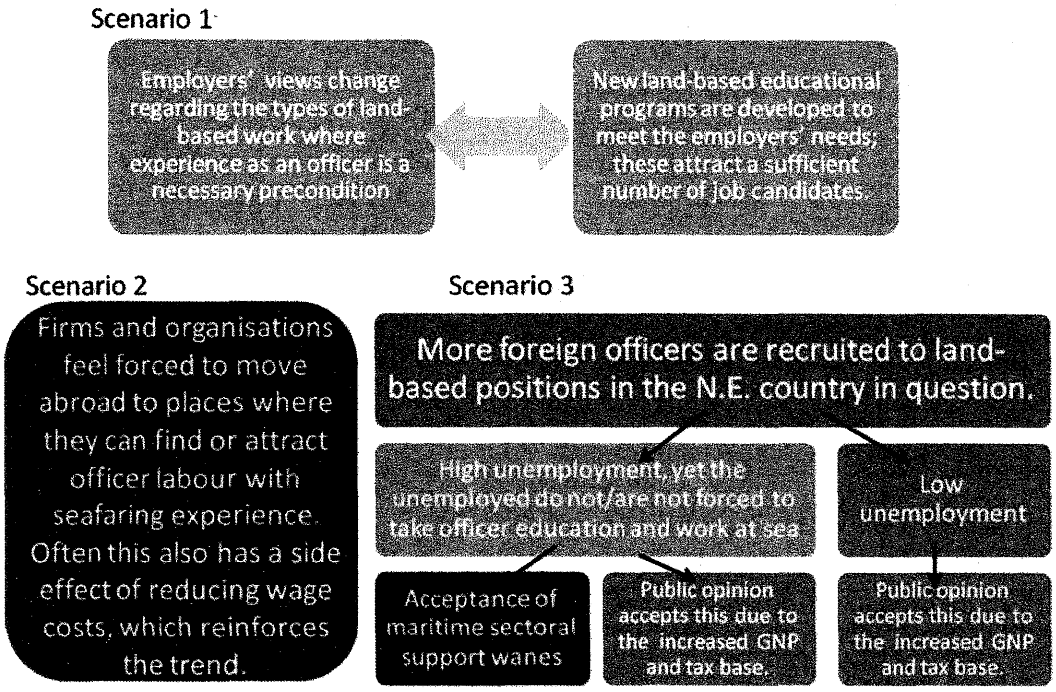


Fig. 7. Possible maritime industry and societal reactions to trained seafarer shortages

Scenario 2 is the scenario feared especially by the UK maritime cluster (Gardner et al [25], McConville & Glen [52], Pettit et al [57]), both because the chain of events of Scenario 2 has already happened to some extent in this cluster (see ibid) and because the cluster also contains relatively many international institutions (such as IMO) and organisations (e.g. the headquarters of ISF/ICS, Intertanko, Intercargo, ITF, etc.) as well as shipping classification and risk assessment companies and maritime insurers and financiers.

The trend of increasingly also recruiting foreign officer labour to land-based positions (i.e. Scenario 3) has been mainly pursued heavily in Singapore and Hong Kong to some extent in the UK (probably due to (a) the presence of international maritime institutions and organisations having headquarters in London and (b) many years of domestic immigration policies allowing well-educated persons from other countries, including especially Commonwealth nations, access to work in Britain) and Norway (due to this country having been unique among OECD nations in that it has had very low unemployment or no unemployment for decades). To some extent it has also been made more possible than previously in later years also in, e.g., Denmark, Germany and the Netherlands through similar differentiated immigration policies that allow firms to employ well-educated persons from non-EU countries in leading positions.

However, Scenarios 2 and 3 also imply an implicit societal threat to the current maritime education financing and also cluster policy-related preferential tonnage tax regimes, where these exist, which then would have further effects upon maritime labour markets. For if fewer nationals are employed in the maritime sectors of certain traditional maritime nations, public support for the preferential regime that maritime companies are subjected to may wane further due to one or more of the following factors:

- Liberalist criticism raised against such regimes (e.g. Schjelderup [63] or Sørensen [65]).
- Especially in the case of high unemployment, domestic public opinion may also favour divesting public support to industries that do not provide jobs for current residents in the countries in question, and anti-immigration parties may also in some countries raise criticisms of the programs that bring foreigners to work in domestic industries, regardless of the underlying supply, demand and potential GNP-enlarging dynamics.
- Finally, left-of-centre and other current 'globalisation regime' critiques (e.g. Fougner [24]) may also raise the charge of 'economic nationalism' of especially the Western European maritime cluster policies, thus furthering unfavourable public opinion on a third front more related to discourses on ethics and global responsibility for development.

In the situation that maritime education finance is cut and/or the preferential tonnage tax regime is partially or totally abolished, we would expect to see labour market effects to the effect that the number of seafaring officers from the traditional OECD maritime nations declines even further and has to be accommodated for by additional increases in educational output and recruiting of officers from transition and developing economies.

In contrast to the situation in OECD countries, in many developing and transition economies, maritime officers, and here especially navigation officers, have to go abroad from their native country if they wish to seek the shore-based employment for which their nautical training also qualifies them to fulfil (EU Commission, DG Fisheries and Maritime Affairs [22], Country report of Poland). However, to the extent that transition economy and developing nations are able to establish shore-based maritime firms (e.g. shipping, crewing or ship management firms or firms in ports) or flag state administration centres, more own shore-based jobs will also be created. For developing and transition countries whose infrastructures are able to provide airport connections and reliable internet, electricity, telephone and cell phone services, there is also the possibility that some financial and 'headquarter' functions may also be moved to these countries. Here, issues such as ownership preferences may decide this, as both family owners and national institutional investors may prefer not to move the 'headquarter' functions abroad (see Mitrossi [53, 54]). Moreover, issues related to general risk in foreign operations (levels of corruption, political stability, criminality) will also be determining factors in the potential decision to move such functions abroad as well as the overall cost level of doing business in the country in question (Jakobsen et al [34]).

In contrast, the potential shore-based labour market for former marine engineers is deemed to be larger in most transition economies and developing countries, as marine engineers can potentially work in the domestic factories or utilities industries (Southampton Solent University [67]) as well as in the petroleum industries of the many developing countries with oil (Amanhyia [2], Osnin [56]). However, here, the wages offered to marine engineers in their home countries may not be competitive in relations to wages that could be earned abroad, so it may be that a substantial portion of marine engineers from transition economies and developing countries also will choose to work abroad, to the potential detriment of maximizing the building up of the domestic utilities and land-based industries. However, in both cases, it is to be expected that many ex patriots will send some income home to family and relatives in their home countries, as this is common practice in most developing and transition economy countries.

Although many developing and transition economy nations, such as the nations of the Africa Union (African Union [1]), would like to build up own shipping industries, the prospects for this are not very positive in our opinion, due to the capital intensive nature of the industry and the lack of private sector donors for such projects. To the contrary, some of the transition economies' shipping industries have experienced demise or deminished market share in recent decades (EU Commission, DG Fisheries and Maritime Affairs [22], Country reports of Estonia, Latvia, Lithuania, Poland and Slovenia; Wu & Morris

[76]), and even among those transition and developing countries that are able to maintain an own shipping industry, there are problems in that many of the officers prefer to work in foreign shipping companies able to offer higher wages and better conditions (see Osnin [56] concerning Malaysia, I-maritime Consultancy Private Limited [31] for the case of India and Wu & Morris [76] for Russia and China). Finally, in some of the least developed countries, the infrastructure deficits are quite severe, meaning that there are substantial locational barriers to such establishment (UNCTAD [70]).

ACKNOWLEDGEMENTS

The authors wish to thank the Danish Maritime Fund for generous funding of René Taudal Poulsen's part of the research for this paper. We also thank our colleagues at the Department of Maritime Research and Innovation and the Centre of Maritime Health and Security of the University of Southern Denmark, Rector Torben Jessen (SIMAC, Svendborg, Denmark) and Vice Chancellor and Captain Suresh Bhardwaj (AMET-India) for valuable comments. Thanks are also due to Senior Manager Peter Grube from BIMCO for making the historical BIMCO/ISF labour market statistics available to René Taudal Poulsen for our research.

References

[1] African Union, Abuja Maritime Transport Declaration, Declaration of the First African Union Conference of Ministers Responsible for Maritime Transport, African Union, 2007, http://www.africa-union.org/root/ua/Conferences/2007/fevrier/IE/doc/DeclarationFinal%20Final.pdf.

[2] Amanhyia, William, "Leveraging Ghana's Maritime Industry for Economic Development", Daily Graphic December 2, 2008, http://www.modernghana.com/news/193078/1/ leveraging-ghanas-maritime-industry-for-economic-d.html.

[3] Amante, Maragtas S.V. "Labor Dimension of the Japan-Philippine Economic Partnership Agreement (JPEPA)", 2007, http://www.ide.go.jp/English/Publish/Download/Vrf/pdf/vrf_429.pdf.

[4] Barzan, Eugen, "Key roles played by shipping companies in the MET process", in Zhukov, D. (Ed.): Proceedings of the 8th Annual General Assembly and Conference International Association of Maritime Universities (IAMU), 2007, pp. 363 – 376.

[5] BIMCO/ISF, The Worldwide Demand for and Supply of Seafarers, BIMCO/ISF/University of Warwick, 1990.

[6] BIMCO/ISF, BIMCO/ISF (1995) Manpower Update. The World-wide Demand for and Supply of Seafarers, BIMCO/ISF/University of Warwick, 1995.

[7] BIMCO/ISF, BIMCO/ISF Manpower 2000 Update: The Worldwide Demand for and Supply of Seafarers, BIMCO/ISF/University of Warwick, 2000.

[8] BIMCO/ISF, BIMCO/ISF Manpower 2005 Update. Summary. The Worldwide Demand for and Supply of Seafarers. BIMCO/ISF/Warwick Institute for Employment Research, 2005.

[9] Bjørndalen, Jørgen & Torger Reve: Kompetanse som internasjonalt konkurransefortrinn: En analyse av det norske maritime industrielle miljø, Stiftelsen for samfunns- og næringslivsforskning, Norges Handelshøyskole, 1995.

[10] Bloor, Michael, Michelle Thomas & Tony Lane, "Health Risks in the Global Shipping Industry: An Overview", Health, Risk & Society, 2(3), 2000, pp. 329 – 340.

[11] Bonnin, Debby, Tony Lane, Shaun Ruggunan & Geoffrey Wood, "Training and development in the maritime industry: the case of South Africa", Human Resource Development International, Vol. 7, No. 1, 2004, pp. 7 – 22.

[12] Cahoon, Stephen and Hillary Haugstetter, Shipping, shortages and generation Y, Department of Maritime and Logistics Management of the Australian Maritime College, 2008, http://www.he-alert.org/documents/published/he00760.pdf.

[13] Cicek, K. & I.D. Er, Economic Constraints on Maritime Training and Education in Turkey, TransNav 7th International Symposium on Navigation at Gdynia Maritime University, Poland, 2007, http://transnav.am.gdynia.pl/transnav07/proceedings/pdfs/44.pdf.

[14] Coleman, Robert, "The human factor: Seafarer focus – an EU perspective", BIMCO Bulletin, Vol. 102, No. 3, 2007, pp. 34 – 36.

[15] Danish Centre for Youth Research, Skibsofficer. En kortlægning og analyse af samspillet mellem de søfartserhvervet og de unge med særlig henblik på rekruttering, Danish Centre for Youth Research/Danish Shipowners' Association, 2003. http://www.cefu.dk/upload/application /172aa757/ rederi_rapport_-_kevin.pdf.

[16] Danish Maritime Authority, Forløbsanalyse for danske søfarende – rekruttering, uddannelse og beskæftigelse. Danish Maritime Authority, 2003, http://www.sofartsstyrelsen.dk/ graphics/ SynkronLibrary/Sofartsstyrelsen/Publikationer/2003/Vaekststrategi/Forloebsanalyse.pdf.

[17] Danish Maritime Authority, International benchmarking af maritime uddannelser i udvalgte lande, Danish Maritime Authority, 2003, http://www.sofartsstyrelsen.dk/graphics/SynkronLibrary/ Sofartsstyrelsen/Publikationer/2003/Vaekststrategi/Benchmarkingrapport.pdf.

[18] Department of Transport, UK, UK Seafarer Statistics, Department of Transport, UK, 2005-2007, http://www.dft.gov.uk/pgr/statistics/datatablespublications/maritime/seafarer/.

[19] Drewry Shipping Consultants, "Manning – seen from a 2008 perspective", BIMCO Bulletin, Vol. 103, No. 6, 2008, pp. 102 – 104.

[20]. Ellis, N. and H. Sampson, The Global Labour Market for Seafarers Working Aboard Merchant Cargo Ships 2003, SIRC, 2008, http://www.sirc.cf.ac.uk/pdf/GLM%20for%20Seafarers.pdf.

[21] Essiet, Daniel, "Why few Nigerian seafarers are getting international jobs", The Nation, 18 Nov 2008, www.thenationonlinge.com/dynamicpage.aspid=70106.

[22] EU Commission, DG Fisheries and Maritime Affairs, An exhaustive analysis of employment trends in all sectors related to the sea or using sea resources, EU Commission and ECOTEC Research & Consulting, 2006, http://ec.europa.eu/maritimeaffairs/study_employment_en.html.

[23] EU Commission, Towards a future Maritime Policy for the Union, EU Commission, 2006, http://ec.europa.eu/maritimeaffairs/pdf/com_2006_0275_en_part2.pdf.

[24] Fougner, Tore, "Economic Nationalism and Maritime Policy in Norway", Cooperation and Conflict, Vol. 41, No. 2, 2006, pp. 177 – 201.

[25] Gardner, B. M., P.B. Marlow, M.M. Naim, R.V. Nair & S.J. Pettit, The UK economy's requirements for people with experience of working at sea 2003. Technical Report. Department for Transport, UK, 2004, http://library.coastweb.info/314/.

[26] Glen, David, "What do we know about the labour market for seafarers?: A view from the UK", Marine Policy, Vol. 32, 2008, pp. 845 – 855.

[27] Glen, David, John Dowden & Robert Wilson, United Kingdom Seafarers Analysis 2006. Report for Department of Transport, UK Department of Transport, 2007, http://www.dft. gov.uk/162259/ 162469/221412/221658/223737/236072/seafarerrep2006.pdf.

[28] Griffett, Trevor, "Seagoing training – models for the future, alternative recruitment and training models from overseas", 4th National Shipping Industry Conference, Melbourne, Australia, 19 – 20 February 2004, http://www.amsa.gov.au/natship_2004/proceedings/TrevorGriffett.pdf.

[29].Hand, Marcus, "Ten thousand new ships minus sailors equals chaos", Lloyd's List, May 23, 2008, p. 9.

[30] Haralambides, Hercules E., "An Econometric Analysis of the Sea-Going Labour Market", Logistics and Transportation Review, Vol. 27, No. 1, 1991, pp. 15 – 31.

[31] I-maritime Consultancy Private Limited, A Survey of Maritime Education in India, 2008. http://www.imaritime.com/backoffice/published_files/Maritime_education_in_india.pdf.

[32] International Bargaining Forum, International Bargaining Forum Agrees Seafarers Pay, International Bargaining Forum, 27 September 2007, http://www.imec.org.uk/editoriles/ File/ Press%20Release%20%20%20INTERNATIONAL%20BARGAINING%20FORUM%20AGREES %20SEAFARERS%20PAY.pdf.

[33] Islam, E.A., "Improvement of the Existing Examination and Evaluation System for Competency for Graduates of the IAMU Member Maritime Universities/Faculties", IAMU Journal, Vol. 1, No. 1, June 2000, pp. 17 – 27.

[34] Jakobsen, Erik W., Ari Mortensen, Martin Vikesland, Alexander W. Cappelen, Attracting the winners: The competitiveness of five European maritime industries. Kolofon, 2004.

[35] JICA, "Egypt – Maritime Education and Training", JICA, 2000, http://www.jica.go.jp/ english/operations/evaluation/jica_archive/reports/2000/pdf/2001_0415.pdf

[36] Klikauer, Thomas & Richard Morris, "Into murky waters: Globalisation and deregulation in Germany's shipping employee relations", Employee Relations, Vol. 24, No. 1, 2002, pp. 12-28.

[37] Koch-Baumgarten, S., 'Trade Union Regime Formation Under the Conditions of Globalization in the Transport Sector: Attempts at Transnational Trade Union Regulation of Flag-of-Convenience Shipping', International Review of Social History, 43, 1998, pp. 369 – 402.

[38] Kostylev, Ivan, "International Cooperation of Shipping Companies and AMSMA for the Training of Seafarers", IAMU Assembly, Dalian, 2006, http://www.iamuedu.org/general assembly/aga7/ projectsession/12_InternationalCooperation.pdf.

[39] Leggate, Heather and James McConville', "The Economics of the Seafaring Labour Market", in Grammenos, Costas, Ed.: The Handbook of Maritime Economics and Business, Informa Publications, 2002, pp. 443 – 469.

[40] Lewarn, Barrie, A Review of some solutions to the shortage of maritime skills, Occassional paper 1 of the Maritime Transport Policy Centre of the Australian Maritime College, University of Tasmania, 2009, http://www.amc.edu.au/system/files/MTPC+Occasional+Paper+1.pdf.

[41] Lin, C.T., S.M. Wang and C.T. Chaing, "Manpower supply and demand of ocean deck officers in Taiwan", Maritime Policy and Management, Vol. 28, No. 1, 2001, pp. 91 – 102.

[42] Llácer, Francisco J. Montero, "Open registers: Past, present and future", Marine Policy, Vol. 27, 2003, pp. 513 – 523.

[43] Lloyd's List, "Jamaican cadets find first jobs in Germany", Lloyd's List, October 15, 2008, p. 5.

[44] Lloyd's List, "India eases ban on foreign seafarers", Lloyd's List, July 29, 2008, p. 16.

[45] Lloyd's List, "German initiative sees 250 % increase in maritime recruits", Lloyd's List, June 26, 2008, p. 4.

[46] Lloyd's List, "Poaching officers 'not way ahead", Lloyd's List, October 31, 2007, p. 12.

[47] Lloyd's Ship Manager, "OSM builds success on staff", Lloyd's Ship Manager, September 2008, pp. 17 – 18.

[48] Lloyd's Ship Manager, "InterManager backs call for more cadet berths", Lloyd's Ship Manager, December 2007/January 2008, p. 10.

[49] Lloyd's Ship Manager, "Shortages ashore and at sea, Lloyd's Ship Manager, October 2007, p. 28.

[50] Lloyd's Ship Manager, "Make two trainees per ship mandatory", Lloyd's Ship Manager, September 2007, p. 7.

[51] Mazzarino, Marco, "Costs and Financing of Maritime Education and Training in Europe: Analysis and Policy Implications", Transition Studies Review, Vol. 12, No. 1, 2005, pp. 147 – 160.

[52] McConville, James and David Glen, "The employment implications of the United Kingdom's merchant fleet's decline", Marine Policy, Vol. 21, No. 2, 1997, pp. 267 – 276.

[53] Mitrossi, Kyriaki, "The ship owners' stance on third-part ship management: An empirical study", Maritime Policy and Management, 31(1), 2004, pp. 31 – 45.

[54] Mitrossi, Kyriaki, "The role of organisational characteristics of ship owning firms in the use of third party management", Marine Policy, Vol. 28, 2004, pp. 325 – 333.

[55] Obando-Rojas, Bernardo, "Increasing your employment potential", The Sea, May-June 2003, p. 4.

[56] Osnin, Noor Apandi, MIMA survey – Manpower Profile of the Malaysian Shipping Industry, Paper of the Maritime Institute of Malaysia, Centre for Ocean Law and Policy, 2001, http://www.mima.gov.my/mima/htmls/papers/pdf/apandi/seafarer.pdf.

[57] Pettit, S.J., B.M. Gardner, P.B. Marlow, M.M. Naim and R. Nair, "Ex-seafarers shore-based employment: the current UK situation", Marine Policy, Vol. 29, No. 6, 2005, pp. 521 – 531.

[58] Porter, Michael E., The Competitive Advantage of Nations. The Free Press, 1990.

[59] Pourzanjani, Malek, Jens-Uwe Schröder & Günther Zade, "Maritime education and training (MET) in the European Union: How can maritime administrations support MET?", IAMU Journal, Vol. 2, No. 2, December 2002, pp. 50 – 56.

[60] Ready, N.P. (1998): Ship Registration, Third Edition, Business of Shipping Series, Lloyd's of London Press.

[61] Ruhullah, Ahmed, "The Supply Chain Management of Maritime Labour and the Role of Manning Agents: Implications and Research Directions", IAMU Journal, Vol. 3, No. 1, June 2004, pp. 23 – 32.

[62] Sampson, Helen, "Romantic rhetoric, revisionist reality: the effectiveness of regulation in maritime education and training", Journal of Vocational Education and Training, 56 (2), 2004, pp. 245 – 268.

[63] Schjelderup, Guttorm, En enkel model for NOKUS-beskatning. NOU 2006:4, Rederiskatteutvalget, 2006, http://www.regjeringen.no/nb/dep/fin/dok/nouer/2006/nou-2006-4.html?id=156984.

[64] Short, Rod, "Global Trends, Challenges and Opportunities", AMETIAP Seminar MET: What is wrong? What do do?, Shanghai, 25 October 2004, http://www.healert.org/documents/published/he00185.pdf.

[65] Sørensen, Peter Birch, "Bør rederier og andre mobile erhverv skattebegunstiges?", Paper 2006/25 of the Economic Policy Research Unit of the University of Copenhagen's Department of Economics, 2006, http://www.econ.ku.dk/eprn_epru/Analyse/analyse25.pdf.

[66] South African Press Association, Shipping industry in crisis, South African Press Association, May 14, 2008, http://secure.fin24.com/articles/default/display_article.aspx?ArticleId=2322422.

[67] Southampton Solent University, The Mapping of Career Paths in the Maritime Industries. Southampton Solent University/European Community Shipowners' Associations (ECSA)/ European Transport Workers Federation (ETF), 2005, http://www.ecsa.be/publications/054.pdf.

[68] Stopford, Martin, Maritime Economics, Routledge, 2008.

[69] Tsamourgelis, I., "Employment practices and Greek shipping competitiveness", in Palis, A.: Maritime Transport: The Greek Paradigm, Series: Research in Transportation Economics, Elsevier, Vol. 21, 2007.

[70] UNCTAD, Review of Maritime Transport 2006, United Nations/UNCTAD, 2006, http://www.unctad.org/Templates/Page.asp?intItemID=2618&lang=1.

[71] Uy, Dang Van & Pham Zuan Duong, "The improvement of Higher MET at Vietnam Maritime University by enhancement of the linkage with industries and international relations", TransNav 7th International Symposium on Navigation, Gdynia Maritime University, 2007, http://transnav.am.gdynia.pl/transnav07/proceedings/pdfs/029.pdf.

[72] Van der Aa, Jansen, & Stuivenberg, Monitor Maritieme Arbeidsmarkt 2008/2006/2003. Nederland Maritiem Land Series. Delft University Press, 2003/2006/2008, http://forum.dutch-maritime-network.nl/forum/nml/dispatch.cgi/f.nmlseriepub/.

[73] Waals, F.A. and Albert W. Veenstra, "A forecast model and benchmarking of the supply and demand of maritime officers", Erasmus University Rotterdam, 2002, www.eclac.cl/Transporte/perfil/iame_papers/proceedings/Waals_et_al.doc.

[74] Wagtmann, Maria Anne, "Current Issues in Maritime Health", Mercator, September 2008, pp. 127 – 129.

[75]. Willingale, M., Ship Management, Third Edition, Business of Shipping Series, Lloyd's of London Press, 1998.

[76] Wu, Bin & Jonathan Morris, "'A life on the ocean wave': the 'post-socialist' careers of Chinese, Russian and East European seafarers", International Journal of Human Resource Management, 17(1), 2006, pp. 25 – 48.

[77] Wu, Zhaolin, "Policy on the reforms and improvements of maritime education in China", IAMU Journal, Vol. 3, No. 1, 2004.

[78] Yamamoto, Hisashi, "The Analysis and Assessment of the Current Reality and the Future Needs of the Maritime Education and Training System, as well as the Certification System in the International Maritime Society", IAMU Journal, Vol. 2, No. 1, March 2002, pp. 65 – 72.

[79] Yilmaz, Pelin, Aydin Şalci & Onur Sabri Durak, "Academic Spin-offs with the aspects of Academic Entrepreneurship in Maritime Universities", in Zhukov, Dmitriy, Ed. (2009): World Maritime Excellence. Proceedings of the 2007 IAMU Assembly, Odessa National Maritime Academy, pp. 159 – 171, http://www.onma.edu.ua/iamuaga8/proceedings.pdf.

[80] Zarach, Stephanie, "Recruitment & Training: the Hong Kong Perspective", BIMCO Bulletin, Vol. 103, No. 6, 2008, pp. 38 – 42.

[81] Zac, D., P. Komadina and B. Pritchard, "Toward a global standard MET system – an analysis of the strengths and weaknesses of present MET systems", IAMU Journal, Vol. 1, No. 1, June 2000, pp. 62 – 67.

[82]. Zhao, Minghua and Maragtas S.V. Amante, 'Chinese and Filipino Seafarers: race to the top or race to the bottom?', Modern Asian Studies, Vol. 39, No. 3, 2003, pp. 535 – 557.

DEVELOPMENT OF MARITIME TRAINING AND EDUCATION (MET) TO MEET FUTURE INDUSTRY DEMANDS

Andrew Hair,
MBA, Master Mariner
Associate Director (Business Operations)
Warsash Maritime Academy
(Faculty of Southampton Solent University)
E-mail: andy.hair@solent.ac.uk

Abstract. The global maritime industry faces significant challenges over the next decade as it copes with and recovers from the current economic downturn, deals with the growing shortage of experienced seafarers, complies with an increasing legislative burden and utilises new technologies to improve operational performance. Maritime Education and Training (MET) institutions will be obliged to engage more closely with industry to ensure that MET provision effectively supports the solutions to these challenges and is capable of meeting the changing demands of both industry and individual seafarers. While industry must recognise the benefits of such engagement and allocate appropriate resources to support it, MET institutions worldwide will also have to evolve from a 'one size fits all' approach to a more flexible and interactive style of delivery if they are to succeed and flourish in the future. Imaginative partnerships between MET institutions and industry bodies or individual companies will also help to drive the advancement of the international maritime industry.

The Tanker Officer Training Standards (TOTS) developed in 2008 by the International Association of Independent Tanker Owners (INTERTANKO) in conjunction with Warsash Maritime Academy (WMA), the Malaysian Maritime Academy and Marlins is an excellent example of how such collaborations can generate positive solutions to industry problems. In this case, an increase in tanker accidents initiated a co-ordinated response by INTERTANKO members and their partnering with MET institutions to address this negative trend by establishing a set of voluntary TOTS for INTERTANKO members. TOTS will ensure tanker officers' competence for general shipboard operations as well as those for specific tanker types such as crude, product and chemical tankers.

The future demands of industry, regulatory bodies and seafarers will inevitably drive the development of MET worldwide, including the development of non-technical skills and closer integration between shipboard and shore-based training. However, MET institutions must embrace the challenges ahead and actively pursue collaborative ventures with industry as part of their own progressive evolution.

1. INTRODUCTION

"As everyone in shipping is aware, the global shortage of seafarers, especially officers, has already reached significant proportions and is now a source of genuine concern to all involved in the industry". Efthimios E. Mitropoulos, Secretary-General, International Maritime Organization (2008) [1].

The growing worldwide shortage of experienced ships' officers is just one of a number of significant challenges faced by the global maritime industry over the coming decade but it seems likely that overcoming this particular challenge will be the most critical task ahead.

While the current economic downturn is alleviating the immediate demand for additional officers to some degree through vessel lay-ups and disposal of old tonnage, it is inevitable that this demand will grow rapidly again when the economic cycle swings upwards once more.

Recruitment, retention and quality of Maritime Education and Training (MET) will all be pivotal factors in meeting the increased demand but this will undoubtedly provide unique opportunities for MET institutions worldwide to collaborate with the key stakeholders (i.e. industry, regulatory bodies and seafarers).

From the assistance given to industry for recruitment activities, to the provision of higher level qualifications and continuing professional development (CPD) to aid seafarer retention, and the ongoing development of MET delivery to meet the changing demands of key stakeholders, MET institutions will be required to 'raise their game' way beyond current expectations.

The introduction of new technologies to improve operational performance and an increasing legislative burden will also present considerable tests for the maritime industry in coming years but these can be passed if the key stakeholders engage more closely with MET institutions to source the necessary solutions, address the changing demands and drive the development of MET from a 'one size fits all' approach to a more flexible and interactive style of delivery.

The purpose of this paper is to review the key challenges for the global maritime industry over the next decade and to identify some of the opportunities for development of MET to help address those challenges and meet future industry demands.

2. BACKGROUND

Considerable growth has been seen over the past decade in the number of commercial vessels operating worldwide, as global trade increased rapidly and vessel operators invested heavily in their fleet expansion programmes to meet the associated requirement for cargo transportation.

Demand for both officers and ratings increased proportionately as a result and the BIMCO/ISF Manpower 2005 Update [2] estimated that there was a current shortage of 10,000 officers on worldwide demand of 476,000, and predicted that the shortfall would rise to 27,000 by 2015. The report also identified a continuing shift of the labour market away from OECD countries (Western Europe, Japan, North America etc.) towards the Far East, Indian sub-continent, Eastern Europe and China, and a need to progress Asian seafarers to senior positions to offset future shortages.

In the meantime, the world fleet continues to rely heavily on ageing officers from OECD countries in senior positions, with over 25 % aged over 50 and over 50 % aged over 40. The demographic time bomb is apparently ticking loudly, with potentially severe consequences if the issue is not addressed quickly.

The report concluded that recruitment and training levels needed to increase further to meet anticipated demand, while retention rates also needed to rise (with 10 % of officer trainees failing to complete initial training).

Earlier this year though, new research was published by Drewry Shipping Consultants [3] on the manpower shortage, which has apparently become more acute. The research assessed the current shortfall to be 33,000 officers on worldwide demand of 498,000, and predicted that the shortfall would rise to 56,000 by 2013 based on present trends. Even if the current economic downturn results in 10 % of new build orders being cancelled and vessel disposal rates increasing by 10 %, the research estimates that the shortfall will rise to 42,700 within four years.

While the statistics may vary, the message is quite clear: there is a significant, growing shortage of officers, which will have a major impact on shipping operations and the volume of world trade if it is not addressed in short order. The maritime industry is already seeing the negative impact on its operations and officers of reduced leave periods, increased workloads and rapid promotion without experience in depth, which will be exacerbated further as any shortfall increases.

Regulatory pressures will also grow in the coming years. The introduction of the International Ship and Port Facility Security (ISPS) Code has already produced an additional administrative burden on officers, along with a raft of existing legislation related to vessel operation, pollution, port state control, ballast water management etc. This burden will intensify as environmental issues come to the fore, including CO_2 emission control and use of green technology.

The current comprehensive review by IMO of the Standards of Training, Certification and Watchkeeping for Seafarers (STCW) is also close to finalisation and will result in some additional mandatory training requirements (e.g. Bridge and Engine Room resource management training etc.).

Technological advances bring their own challenges as officers have to adapt to new specialised equipment, modes of operation and system requirements (e.g. integrated bridge systems, advanced propulsion systems, electronic control systems etc.).

This has been highlighted again by the discussions during the STCW review on the potential need for dedicated Electro-Technical Officers (ETOs) as a third officer certification stream alongside the traditional navigation and engineering routes. If this initiative is eventually ratified, having an electronic and electrical specialist included within a ship's complement would certainly alleviate the burden on the Marine Engineering team.

It is against this background that MET institutions have to evaluate current practice and modes of delivery before determining fitness for purpose and opportunities for innovative improvements.

3. CURRENT MARITIME EDUCATION & TRAINING PROVISION

The range of academic and practical abilities of our officer recruits today requires a more structured approach to conversion of the young people into the highly-skilled staff needed for the latest generation of vessels coming on stream. Recent experience in the UK has shown that a significant proportion of our new entrants have not acquired the same depth of academic knowledge in key subject areas, such as mathematics and science, which have traditionally underpinned the nautical and engineering sciences undertaken by our officer trainees.

This has generated considerable pressure on MET institutions to first bring the new recruits up to an academic level commensurate with entry on to a marine certification programme and then, in conjunction with shipboard training staff, progress their academic and professional development to the level required for initial Officer of the Watch (OOW) certification.

It should also be noted that the duration of a typical UK officer cadetship today is only three years, a full year less than 20 years ago due to reductions in the minimum sea service requirement, watchkeeping time and shore-based tuition, which have resulted from global competitive pressures and the introduction of STCW '95. However, while the duration of an officer cadetship has decreased, the UK's course syllabi have been rationalised and increased to incorporate full academic exemptions to Master or Chief Engineer level.

At the same time, marine technology and equipment is evolving rapidly to meet the demands of a globally competitive industry in which reduced manning levels have to be effectively supported, and efficiencies and cost savings are sought in all areas (e.g. propulsion systems and fuel costs, cargo handling systems and port turnaround times etc.), while a clear focus remains on safety and environmental issues.

While UK government funding currently offsets the relatively low tuition fees being charged to our globally-focussed customers, the ability of MET institutions to invest heavily on a regular basis in new ranges of high-tech equipment is somewhat limited.

Financial circumstances dictate that our institutions maintain a complement of core generic equipment, such as Bridge and Engine Room simulators, which serve to deliver all STCW certification elements and some more advanced CPD training, while shipping companies will often use their equipment manufacturers for specialised training courses (e.g. integrated bridge systems, new propulsion technology).

The traditional "chalk and talk" approach in the classroom has largely been replaced with interactive whiteboards and electronic presentations to engage the computer-friendly generation, while a number of Intranet and computer based training (CBT) packages provide additional tuition and assessment tools.

Simulator time has also being integrated into the requirements for certification, with Bridge Watchkeeping courses now compulsory elements of OOW and Chief Mate courses.

The rising academic expectations of potential officer recruits and their parents have resulted in the development of vocational degrees as the mainstream routes to initial UK certification. The true value of marine qualifications is still not readily acknowledged outside of the maritime industry so the introduction of degree-based programmes has been a welcome development, with young officers having an early opportunity to gain an Honours degree to complement their professional qualifications.

The degree-based programmes also provide "added value" in the form of management and skills development, which should enhance the prospects for UK/EU Officers who are comparably expensive to employ. More importantly perhaps, the qualifications gained will provide the springboard for professional and career progression, whether an individual remains at sea or pursues opportunities in the wider maritime industry.

Consideration also has to be given to how the individual is developed to cope with the stresses and strains of life aboard ship, away from friends and family for long periods, as well as acquiring initial professional competency and the further development required before serving in higher ranks. This starts with the initial pre-sea induction, familiarisation and underpinning knowledge but progresses over time to encompass higher-level activities, which both engage the individual and provide a means of progression.

As do other MET institutions, WMA already offers some guided learning courses and a virtual learning environment (VLE) to facilitate off-site delivery of required underpinning knowledge. This is a more convenient, flexible and cheaper option for some of our students, particularly those from overseas, and is an area of the business that will inevitably increase in scope and size.

WMA has also incorporated a blended learning approach in the Honours degree programmes so that students can achieve the qualification without the cost burden of a full additional year of Academy-based training or the associated delay to their professional career progression.

Particular attention and much research is now being dedicated to 'Human Element' issues, such as leadership skills, individual workloads due to manning levels or operational demands, the fatigue and stress generated during lengthy or intensive sea appointments, and the common mistakes made under pressure.

There is also a growing demand for shore-based refresher training in areas that are impossible to replicate on board ship (e.g. live fire fighting) or where procedures are not used very often or change frequently (e.g. medical care). Some nations have already introduced mandatory refresher training as part of certificate revalidation (e.g. Proficiency in Medical Care) but there is an ongoing debate at IMO about the need to make this training uniform and compulsory.

Distance learning is being developed and improved, potentially enabling the technical content of a marine education to be delivered more flexibly and upon demand. However, unless shipboard workloads can be reduced, seafarers are unlikely to have much time to study onboard and the effectiveness of such training is then called into question. Also, while communication costs have come down, there is still a significant cost associated with delivery aboard ship.

Research by the Seafarers International Research Centre (SIRC) in 2005 [4] indicated that '*seafarers had broadly positive views of CBT despite the fact that significant numbers of them had experienced problems in using CBT on board.*'

These problems included lack of support from senior officers, time available, range of resources, CBT design and fatigue. The report also advised that '*in providing CBT on board it is important that ship operators do not regard this as an adequate substitute for the provision of leisure or recreational facilities/time.*'

While distance learning will play a bigger role in future, it does not suit everyone and the more supportive learning environment provided by a MET institution will still be needed for the foreseeable future as it facilitates the full professional and personal development of students, including the self-confidence, attitude and outlook that will enable them to survive and develop whilst at sea. However, time in a MET institution may well be reduced in future by the use of pre-attendance distance learning study packs/programmes, which might be of particular interest to overseas students but would not be a complete substitute for academy attendance.

4. SUPPORTING RECRUITMENT AND RETENTION

With the UK government's drive to raise the school-leaving age to 18 within a few years, it is likely that the combination of degree course provision, sponsored training in an age of top-up tuition fees, early professional certification and good employment/promotion prospects will attract the new generation of highly-skilled staff who are needed to manage and operate our expensive and high-tech merchant vessels.

WMA has already seen a substantial increase in the proportion of officer trainees starting degree-based courses, rising from 45 % upon first introduction in 2006/2007 to 63 % in 2008/2009. This looks set to continue as the maritime industry continues to raise awareness of the career opportunities available in a truly global business at a time when unemployment is rising in other sectors, resulting in more high calibre recruits being attracted to the industry.

In the meantime, MET institutions can make a significant contribution to reducing the current shortage of personnel, specifically by training more seafarers, training more quickly where appropriate (e.g. conversion of existing certificated officers to work in specialist short-staffed sectors such as LNG), using MET to address lack of experience (e.g. through simulation courses, manned model ship handling, management skills development etc.) and adopting new delivery approaches to increase accessibility (e.g. use of online learning through a VLE).

MET institutions can also support industry in their recruitment activities in a number of ways, including:

- Increasing capacity and resources to cope with the higher numbers of recruits needed by our industry (e.g. WMA has tripled its number of officer recruits within five years but has sustained this growth with increased staffing, supplementary teaching space, acquisition of additional technical equipment etc.).
- Provision of attractive, accessible MET programmes and comparable academic awards to other professional occupations (e.g. degree programmes), thus laying the foundation for a wider career in the maritime industry if they come ashore later on in their careers
- Raising the profile and acceptance of professional maritime qualifications through accreditation of prior learning and benchmarking to academic frameworks
- Promotion of careers at sea (e.g. hosting of careers events, publication of careers information for use by careers advisers, availability of comprehensive reference material on the institution's website etc.).
- Participation in industry events (e.g. sharing a careers stand with shipping companies at national/international events, supporting specialist engineering competitions etc.).
- Engaging with local/national media to raise the profile and awareness of media-friendly activities (e.g. demonstrations of specialist equipment such as simulators and manned models, supporting the filming of documentary programmes etc.).
- Spreading the word (e.g. attendance and speaking at local and international conferences, visiting schools and colleges to give presentations etc.).

MET institutions can also help to improve seafarer retention rates in various ways, including:

- Effective induction and familiarisation activities during the first academy period, with support staff available to deal with personal issues, homesickness, counselling, academic support etc.
- Successful preparation for the first sea phase, including delivery of necessary underpinning knowledge, STCW short courses and familiarisation with training portfolios to be completed aboard ship.
- Availability of academy staff by telephone or e-mail to assist with any training-related difficulties experienced by trainees during the sea phases.
- Delivery of high quality MET provision to support achievement of professional qualifications, competency and advancement.
- Availability of CPD opportunities (e.g. upgrading of professional certification, conversion to specialist sectors, management development, leadership training etc.).
- Providing access to postgraduate academic programmes (e.g. Honours and Masters degree programmes) for those officers seeking further progression opportunities, to either support their roles as senior ship staff or help them transition into other roles within the maritime industry ashore.

5. FUTURE TRENDS FOR MARITIME EDUCATION & TRAINING PROVISION

Most of the maritime industry now realises that people are the industry's greatest assets, and this recognition will help to drive the development of MET provision through the 21st century. However, this will involve effective engagement with the key stakeholders and the sourcing of supporting funds, whether from national administrations or bodies, shipping companies, internal investment or a combination of available resources (financial or otherwise).

While the short term objective is to recruit and train sufficient new recruits to deal with the current officer shortages, longer term goals will focus on retention and development of these officers to eliminate skills gaps and restore a sustainable rate of professional progression.

The increased capacity and availability of high quality MET provision will be the initial building block for recovery of a sustainable and competent global maritime workforce. However, the longer term goals will not be achieved without meeting the aspirations and career goals of individuals, and MET institutions have a vital role in providing the right training and education opportunities (e.g. CPD, postgraduate awards etc.).

Some new MET provision will be introduced to comply with additional mandatory STCW requirements, such as Bridge and Engine resource management courses. Other provision will evolve from specific company requirements (e.g. bespoke simulator training) or other collaborative ventures.

A few shipping companies are choosing to set up their own training centres to ensure that some of their core needs are adequately provided for. For example, Maersk has now opened four training centres worldwide (Denmark, UK, India and China) covering a range of MET activities such as ECDIS and bridge simulation [5], and is now in a position to offer its spare capacity to the open market. Similarly, Anglo Eastern has recently opened its own Maritime Academy in Mumbai [6], at an initial cost of $14m to train up to 400 officer cadets per year.

Ongoing technological advances will see the provision of online learning through a VLE, CBT, guided studies and blended learning programmes becoming mainstream activities. MET institutions will need to evolve their provision to a more flexible and interactive style of delivery if they are to succeed and flourish in the future.

There are likely to be a number of other shore-based training developments over the next 10 years, including:

- Increasing emphasis on team training, refresher training, environmental protection and 'human element' issues.
- Development of simulation with new technologies (e.g. virtual reality is now entering the marine simulator market place, which will enable future students to familiarise themselves with a new ship, even before it is built, by 'walking' around the ship's machinery spaces and decks).
- Simulation will also allow experienced officers and pilots to experiment with different operational procedures, or help with activities such as port design, educating non-seafarers (e.g. solicitors for P&I), and casualty investigation.
- Greater integration between operational areas in simulation scenarios (e.g. exercise linkages between bridge, engine room and cargo operations, with an increasing emphasis on environmental protection).

Finally, the interface between shore and shipboard training will also develop in the coming years, including:

- An industry driven structure (e.g. "best practice" developed through collaboration between MET institutions, companies, regulatory bodies and seafarers).
- Closer integration between ship and shore-based training (e.g. training programmes involving distance learning or guided study aboard ship, the design of which complements the education or training delivery at the academy).
- Development of non-technical skills (e.g. interpersonal skills, leadership) and team effectiveness through shipboard evaluation and delivery.
- Effective and timely planning for future training requirements.

6. COLLABORATIVE VENTURES

MET institutions will be obliged to engage more closely with key stakeholders to ensure that MET provision effectively sustains the solutions to the challenges ahead and is capable of meeting the changing demands of both industry and individual seafarers. At the same time, industry and regulatory bodies must be encouraged to recognise the benefits of such engagement and allocate appropriate resources to support it.

WMA has become involved in a number of collaborative ventures over recent years, ranging from working closely with individual companies to develop bespoke training packages (e.g. Bridge Team Management) or evaluate shipboard performance (e.g. WMA staff travelling aboard ship to review the effectiveness of bridge and engine room teams) to more extensive collaborations with groups of maritime partners.

Our collaboration with the International Maritime Training Trust (IMTT) two years ago has led to the development of a Postgraduate Certificate in Teaching and Learning for modular and blended learning delivery to Filipino lecturers in both the Philippines and at WMA. The key objective was to improve overall teaching practice, to the benefit of both lecturers and their students.

The Tanker Officer Training Standards (TOTS) [7] developed in 2008 by the International Association of Independent Tanker Owners (INTERTANKO) in conjunction with Warsash Maritime Academy (WMA), the Malaysian Maritime Academy and Marlins is an excellent example of how such collaborations can generate positive solutions to industry problems.

In this case, an increase in tanker accidents initiated a co-ordinated response by INTERTANKO members and their partnering with MET institutions to address this negative trend by establishing a set of voluntary TOTS for INTERTANKO members. TOTS will ensure tanker officers' competence for general shipboard operations as well as those for specific tanker types such as crude, product and chemical tankers.

In May 2009, the TOTS initiative won the Seatrade Award 2009 for the category of 'Investment in People', which recognises a significant contribution to the recruitment, training, retention and advancement of the industry's most valuable asset, its people.

WMA has also recently been awarded the co-ordinating role on the EU Commission's "Project Horizon", a 2½-year collaborative project to conduct research into the effects of fatigue on the cognitive performance of maritime watch-keepers under different watch patterns, using ship's bridge, engine and liquid cargo handling simulators. WMA will be working with 11 other European partners on this project, including Chalmers University in Sweden, Bureau Veritas in France, INTERTANKO and the UK's Maritime and Coastguard Agency.

There will inevitably be practical spin-offs from closer links with shipping companies (e.g. use of simulators to evaluate pilotage into new port areas for particular vessels, availability of guest company lecturers with specific current expertise etc.).

Other benefits may be gained from links with equipment manufacturers (e.g. evaluation of life saving appliances and fire fighting equipment through frequent use on training grounds, informed comments from specialist lecturing staff etc.).

Finally, there will be greater collaboration between MET institutions themselves, whether individually or through MET associations such as the International Association of Maritime Universities (IAMU), the Global Maritime Education and Training Association (GlobalMET) and the International Association of Maritime Institutions (IAMI).

An enormous amount of work is already being carried out in supporting fellow MET institutions, such as assistance with curriculum development, establishment of new course provision, peer review and information exchange. This will hopefully assist worldwide MET standards to improve significantly over the coming years.

7. CONCLUSION

MET trends in the 21st century will be driven in the short term by the need to address the significant shortages in officers, including the requirement for increased capacity and resources at MET institutions worldwide, while longer term goals will focus on retention and development of these new officers to eliminate skills gaps and restore a sustainable rate of professional progression. However, effective engagement with industry will be essential for identification of global priorities and gaining support for the necessary evolution of MET activities to meet future demands of key stakeholders.

Improvements in the quality of global MET provision will also need to be achieved if the overall standards of competency are to be raised, and this will be achieved through a number of concerted activities, such as academic collaborations (e.g. WMA's postgraduate course for overseas lecturers), effective regulatory oversight and audit of MET provision, upgrading of IMO model courses and work undertaken by MET associations such as IAMU, GlobalMET and IAMI.

Longer term trends will also include the introduction of more flexible and interactive MET provision, increased focus on the effective development of the industry's key assets (i.e. its seafarers) to meet future requirements, and a more collaborative approach to improving MET provision, which is fit for purpose in the modern, technological world.

In summary, MET institutions cannot afford to be complacent in the face of significant global challenges. They will be obliged to conduct proactive evaluation of future MET trends and design 'products' to fit the maritime industry's changing demands. This will entail keeping pace with technological advances and regulatory amendments, and responding effectively to global business developments, cultural changes and key stakeholder demands.

References

[1] Mitropoulos, E.E. (2008). Extract from opening remarks by Secretary-General of IMO at the launch of IMO's 'Go to Sea!' campaign. Available online at: http://www.imo.org/includes//blastDataOnly.asp/data_id%3D23810/GotoSea!campaignlaunchSGspeech.doc.

[2] Institute for Employment Research, University of Warwick (2005), '*BIMCO/ISF Manpower 2005 Update: The worldwide demand for and supply of seafarers*'. Summary available online at: http://www.marisec.org/resources/Manpower2005UpdateSUMMARY.pdf.

[3] Nautilus Telegraph (March 2009), '*Shortage set to grow*', p. 1.

[4] Ellis, N., Sampson, H., Aguado, J.C., Baylon, A., Del Rosarion, L., Lim, Y.F., Veiga, J. (2005), '*What Seafarers think of CBT*', Seafarers International Research Centre.

[5] Tanker Operator (April 2009), 'Raising the training bar', p. 26.

[6] Lloyds List (16 March 2009), '*Anglo Eastern in $14m training plan*', p. 1.

[7] INTERTANKO (2008), '*Tanker Officer Training Standard (TOTS) – Frequently Asked TOTS Questions*' Available online at: http://www.intertanko.com/upload/TOTS%20FAQ%20High%20res.pdf.

DEVELOPMENT OF STANDARDS FOR MARITIME ENGLISH – THE EU LEONARDO MARTEL PROJECT

Reza Ziarati,
TUDEV/Piri Reis University, Turkey
Heikki Koivisto,
University of Satakunta, Finland
Janusz Uriasz,
University of Szczecin, Poland
E-mail: heikki.koivisto@samk.fi

Abstract. This paper reports on the progress of the EU funded Leonardo project MarTEL which concerns the development of a set of standards for Maritime English for application in Merchant Navy education and training programmes for cadet officers and officers of various types and ranks. The standards are based on transfer of innovation from existing English language standards and maritime English model courses such as International Maritime Organisation's (IMO) Model course 3.17 and the IMO's SMCP (Standard Maritime Communication Phrases, 2001). Recent reviews by several IMO member countries had identified that 'there is a compelling need to promote a high level of working maritime English language skills' for merchant navy officers.The standards were developed at three different levels referred to as Phases 1, 2 and 3. Phase 1 standard applies to level of Maritime English proficiency required for entry onto Merchant Navy cadet officer programmes for both Deck cadet officers and Marine Engineering cadets officers. Phase 2 is in two parts, Part 1 concerns the standard of Maritime English competency for Deck Officers of Watch and Part 2 relates to competency level for Marine Engineering Officers. Phase 3 is for Senior Officers and again sub-divided into two part, Parts 1 and 2, one for senior Deck officers and one for senior Marine Engineering officers. Each standard has its own set of study guidelines and underpinned by a comprehensive study unit. While the guidelines are to prepare the candidates for a test at given level (Phase), the Study Unit is a knowledge-base of content for each phase. All phases include active skills i.e. Speaking, Listening and Writing. The content for standard is based on active learning and on maritime terminology and usage with less emphasis on grammar. All standards for Cadet, Officer and Senior Officer Levels (Phases) will have different weights on different skills and different proficiency requirements at different ranks and duties. The work on standards commenced after a survey of a range of maritime education and business organisations in partner countries. The paper reports on the results of the initial evaluations with a group of cadets and officers in Finland, Poland, England and Turkey. The outcome of the evaluations were used to redirect the work to ensure the education and business organisations views as well as the cadets and officers who took part either in the survey or actual evaluations were taken into consideration.

1. INTRODUCTION

The reason for instigating the project was that there are no international or European standards for Maritime English. Review of the arguments from the recent IMO meetings (IMO MSC, 2006) considering MSC 82/15/2 and MSC 82/15/3 had identified that 'there is a compelling need to promote a high level of working maritime English language skills'. Several EU member states have invited STW sub-committee to consider how the requirements in the STCW-Code can be strengthened in this connection. It was noted that deficiencies in Maritime English causes accidents (Ziarati, 2006 and recently Ziarati et al, 2009) and therefore needs to be seriously taught (Loginovsky, 2002) in the basic and in the main training of all Chapters of the STCW Code of practice. It is interesting to note that both of the above issues were also the findings of an IMarEST paper and report (TEB, 2007; Ziarati, 2007). This Project therefore is a maritime language competency assessment project for the language certification of the following target groups: i) young people aged 17/18 years old wishing to enter the Merchant Navy as ratings, ii) those embarking on a career as Merchant Navy officers, iii) those intending to hold senior posts as a Chief Mate/Master/Captain and as a Second/Chief Engineers, and iv) those who are working at ports with different degree of seniority including pilots.

The main aim of the project is to develop a series of Maritime English language standards incorporating also the IMO's SMCP, at three different standards: i) Foundation – Elementary and Intermediate/Advanced, ii) Officer – Deck and Engineering, and iii) Senior Officers – Deck and Engineering. The standards have been piloted in several partner sites. Since the inception several other countries have joined the project team.

2. PARTNERSHIP

The partnership is composed of major education and training centres in seven EU member states supported by their awarding, accrediting and certification authorities. The proposal instigator was the representative of IMarEST at recent IMO MSC (2006) and at the same time a member of a Turkish national delegation at the event. Three of the partners are involved in Leonardo proposed projects concerning e-learning (E-GMDSS) and three are involved in another Leonardo project (SOS, 2005) concerning the development and implementation of an integrated programme of education and training for merchant navy cadets and officers. The project team has been working in conjunction with the EU funded MarEng project and was developed jointly with several industrial and commercial organisations in partner countries. There are eight active and many silent partners and two are major awarding and validating bodies. Furthermore, MarEng Plus and MarTEL (2007) partners have agreed to join forces to integrate the work being concluded by both project teams. This would bring the number of the countries working on joint programmes to 32, which are almost all the EU member states as well as Norway, Turkey and Ukraine.

3. CONTENT AND LEVEL

The contents of standards are based on active learning and on maritime terminology and usage with less emphasis on grammar. The Foundation test at advanced level will benchmark the well-known English qualification standards TOEFL 500 and IALTS 5.5 in terms of testing methods rather than their contents. The Officer standards will be based on TOEFL 550 and IALTS 6.0 standards but content will be primarily based on Navigation English and Marine Engineering English IMO model courses 7.03 and 7.04 and in line with STCW 95 requirements including 2003 amendments. The senior officer standards will be equivalent to TOEFL 500 – 600 or IALTS 6.0 – 6.6. All standards for Officer and Senior Officer Levels focus on all skills but with less emphasis on grammar and will have different weights on different skills and different proficiency requirements at different ranks. For example, a Chief Engineer should be competent on comprehension (especially reading) and writing but a more moderate level of speaking may be tolerated. New vocational qualifications are being developed with major national and European awarding and accrediting bodies similar to the EGMDSS qualification (www.egmdss.com), hence the new qualifications are expected to be recognised Europe-wide. The main intangible outcome is that, the standards and their associated study guidelines and units, will provide an opportunity for many companies particularly smaller ones to become involved particularly taking advantage of learning materials and the intended e-learning and e-assessment and facilities for self-learning and self-assessment. Impact is expected to be substantial as the project responds to a European and international acknowledgment of the problem which this project intends to address at source and through lifelong learning. There are many organisations including awarding, accrediting and licensing bodies that are interested in the project.

4. JUSTIFICATION

Shipping is perhaps the most international of the entire world's great industries and some of the most dangerous. Safety of life at sea, the marine environment and over 80 % of the world's trade depends on the professionalism and competence of seafarers. It has been reported that the over 80 % of accident and incidents are due to human error According to (IMO 2005). One of the main causes of accidents and incidents are due to poor standards of maritime English as reported in Ziarati, 2006 and a recent paper (Ziarati et at, 2009) presented at Bridge 2009 conference in Finland in April 2009. The language of the sea is Maritime English and many ships, and to a lesser extent, ports, are manned by multinational crews. Hence, good communication in Maritime English is essential for creation and maintenance of effective working environments and safety of the crew, and generally safety at sea and at ports. There are many reports and papers (MCA –MSC 82/15/02 and MSC 82/15/03) identifying poor communication as one of the most significant factors in accidents at sea and at ports. There is only one Leonardo project viz., English for Dockworkers (E/02/B/F/LA_115852, 2002), which has tried to address the communication problems in dockyards through the development of training materials for self-learning in English language.

The importance of skills in English Language competency was highlighted at the recent IMO Maritime Safety Committee (IMO MSC 82, 2006). Papers presented by the Turkish and UK delegates clearly stated that language competency is a problem. The papers led to discussions at the Human Element Working Group (HEWG) when it was reported that many seafarers have problems in expressing themselves in English and in using maritime terminologies. It was agreed that STCW Convention had to be revised in this connection and IMO's maritime English course model's (based on SMCP) minimum requirements is no longer acceptable. The inadequacy of Maritime English standards has been a major contributory factor in causes of accidents, some involving loss of life, large numbers of injuries and extensive financial loss (Deniz Ticarti, 2006; MAIB, 2006). In a recent paper (Ziarati, 2009) several case studies clearly identified that communication failures are a major area for improvement.

This paper is in line with Loginovsky (2002) which reports on the significance of English as the working language of the international shipping industry and that the overall performance and safety of the international fleet depends on the skill to apply it correctly. He states that the ability of a non-native speaker to have a good command in Maritime English is very much influenced by the ability to think in it in the frame work of the maritime profession. He concludes that to make the teaching and learning processes more effective, it is required to power up the thought activity of a seafarer using English. This proposal has taken note of the recent papers at the IMO MSC event (2006) and recommendations of several international papers (Ziarati, 2006; Loginovsky, 2002) concerning lack of standards or and appropriate underpinning knowledge and skill for maritime English.

There are severe shortages of personnel with sea going experience (Ziarati, 2003; Pourzanjani et al, 2002, Schroder et al, 2004). This is expected to get worse (IER, 2005 report sponsored by ISF and BIMCO). The shortage ranges from some 30000 (IER, 2003) seafarers to over 100000 (Urkmez, 2005). This is anticipated to lead to an overlook of deficiency in competence by shipping companies desperately seeking seafarers to man their vessels.

5. TRANSFER OF INNOVATION

The current practice in many non-English speaking European member countries as well as countries outside Europe is that institutions involved with education of seafarers provide either short course programmes in English for industry or develop six months to one year English preparation programme for cadet officers prior to commencement of the main education programme. Every year thousands of cadet officers come to the UK, through various schemes and pathways, and enrol on various merchant navy education and training programmes for different classes of seafarers. For instance, in some colleges these cadets are sent on 6-months general English course prior to the admission onto merchant navy programmes. In Turkey, for example, generally all officer cadets undergo one year of English preparation. Review of the arrangements for other European countries for training of English seafarers clearly indicates that there are no standards of competence, for maritime English and the actual period of education and training in English language is also different in different countries for given class of seafarer. Often these programmes irrespective of type or level, particularly those concerning cadet officers, are not related to the vocation of seafaring and are grammar based (TOEFL, IALTS, etc). This proposal will establish standards for all classes of seafarers. The UK partners and the silent partners (see www.mardeu.co.uk) would also benefit immensely by standardising the English tests for each and every class of seafarer so that thousands of overseas students coming to the UK (who incidentally in many cases will eventually work for European based shipping companies) would achieve a common standard in English competency prior to commencing their main programme of study and training.

The establishment of standards would help partners to set up test centres offering a valuable operation at their own institution benefiting professionally from such an undertaking. One innovative aspect of the project is that two standards will be offered at elementary and intermediate/advance levels which could be used for industrial updating of existing seafarers employed in ship operation companies at the elementary and intermediate/advance levels.

One other innovative feature is that the standards are skill based, and each standard is being provided with a sample study unit. The unit of study is an attempt to provide the necessary learning and training support for candidates aiming for a particular merchant navy qualification, and hence, is set at a given standard of maritime English.

6. TARGET GROUP

The language preparation programmes in EU member states for education and training of seafarers is not standardised, neither in terms of level or duration of study. For cadet officers, the initial English preparation programme, the duration could range from one to two years, and the examination standards are often set at a local level. Some institutions use standards such as TOEFL and IALTS which are not designed for students following a vocational programme. There are many cases where IMO requirements are integrated within a degree programme at a university. Again in many cases, the examination is not based on European or international standards, and if standards are applied these are of the type mentioned earlier. In all cases reviewed, the English programmes use a similar classical approach for all classes of seafarers. Hence, the existing arrangements do not differentiate between the language skills requirement of different classes of seafarers. Furthermore, the level of competency varies significantly in across institutions in a given country and this even more inconsistent across the EU. In the majority of cases English preparation programmes are grammar based in order to satisfy the need of standards such as TOEFL and IALTS. In this project, a distinction has been made between the English requirements, say for a deck officer of watch and that needed for an engineering officer of watch. The standards are also underpinned by a sample unit of study to encourage vocational reference and ensure the programmes that support these standards focus on skills as well as grammar. The unit of study for each class of seafarer would also set the scene for maintenance of standards in the future and act as a guideline for development of training/learning/testing material.

In non-English speaking countries, many seafarers, especially at below officer levels, have serious problems with English language. To this end, two of the standards of the foundation standards (elementary and intermediate/advanced) can be used to target this particular group. The standards are designed so that industry could use them to assess the competence of their employees at particular standards under development.

7. POTENTIAL USERS

While the potential users are lower and upper secondary school leavers, 'lycee/lise' cadets, young unemployed wishing to entre the merchant navy, and all those employed in the water transportation industries (all ratings, officers and above, deck as well as engineering) as well as all education and training centres concerned with the formation of Merchant Navy personnel, many shipping companies and organisations could use the standards to assess the competence of their employees at a particular standard. To this end, all personnel working in the maritime industry could benefit from these standards as MarTEL provides specific tests for specific vocational requirements for different ranks of seafarers.

Every year thousands of cadets enrol on various education and training programmes to follow a career in merchant navy. The largest user group are the cadet officers studying/training to become an officer of watch either as a Deck officer or an Engineering officer. The second most preferred location is the UK. The advanced foundation tests could be used to standardise the level of competency for both engineering and deck cadet officers before enrolling on their main programme. The tests are being designed to ensure that, if successful, the cadets have reached the required level of competency for progression onto the main programme of study and later as officer of watch. Once an officer, they can take advantage of the tests designed for senior officer for progression to higher ranks, working at sea or at ports.

8. EUROPEAN DIMENSION

The intention of standardising and harmonising the process of testing for maritime English language competency cannot happen without active support from the main representatives of education and training providers worldwide. The experience of various partners in maritime education and training and most of them in English language training has provided an added value to the existing efforts by IMO member counties to reduce communications failures. The standards and the study units that underpinned them can also be used as a means of self-learning and self-assessment which would provide an added value which also widens the demand for the standards being developed in the intended target groups. The partnership intends to seriously support the development of e-learning and e-assessment which has been assigned to two leading partners involved in such developments (www.egmdss.com and www.ewoggle.co.uk). This is expected to increase the existing interest in the project and its dissemination. The partnership is convinced that the plans to link the e-platforms (or one single integrated one) to the website and Internet portals holding the test materials would substantially enhance the possibility of a wider audience within the stated target groups. This project would not have been possible without support from the Leonardo programme and will not be successfully implemented if not supported by major MET providers worldwide. This programme has motivated the partners to come together in a worthy cause and innovatively transfer the existing knowledge and know-how, being developed simultaneously with other recent and current Leonardo projects such as MarEng, MarEng Plus, SOS (www.maredu.co.uk).

The intended work will help the partners to develop a stated strategy for integrated language testing and training particularly for stated three distinctive groups of users.

The maritime English language standards and the study units aim to obtain common levels of consistency of competency for those working or intending to work as a qualified officer in the merchant navy in partner countries, and ultimately worldwide, thus aiming to achieve harmonisation in practice, and consequently introducing a novel approach in Maritime English testing and training for learners and trainers at both national, European and ultimately at international levels.

A report (British Shipping, 1999) particularly refers to the importance of quality maritime skills particularly in communication, and securing seafaring employment in the UK with several references to the importance of improving safety at sea. There have been many publications by northern European countries including Norway. For example a report by NTNU (1999) in Norway identifies the importance of improving the quality of education and training particularly relating to the importance of communication. A paper presented at the World Maritime Technology conference (Ziarati, 2006) specifically identifies the second most contributory factor in accidents and incidents to be related to the lack of competency in verbal and written communication particularly in maritime English.

9. ICT AND ONLINE PLATFORM

ITC platforms has been built on previous development work carried out under Factory of the Future (www.c4ff.co.uk) project which was funded by National and various European programmes including EUREKA. The project director for Factory of the Future is a member of the partnership and has been supporting the ICT developments. The outcome of the current E-GMDSS (2006-2008) funded by the Leonardo programme is being taken into consideration. The e-learning platform being developed by the E-GMDSS has several interesting features which can be included and expanded for application in the project.

A website has been established www.maritime-tests.org for the partners to interact and publish their interim results and report on the progress of the project. Each standard and its unit of study will have its own CD/DVD for use in the classroom and in the simulators. The CDs/DVDs will be made available to partner institutions and other education and training institutions within the European Union. Learners will be introduced to computer based networks linked to the internet giving them access to e-learning packages containing the appropriate standard and its associated unit of study. The e-platform will also be available to enable trainees to learn by themselves and self-assess themselves. The e-learning/assessment platform(s) will be made available to the education and training providers within the partnership.

Object oriented software packages using CDs or DVDs will be developed to respond to the need for easy use of technical information related to the subject of the training unit and the associated standard. The software will provide a means of accessing a range of data on major databases through the Internet.

Existing computer software interfaces developed by C4FF will be considered for interaction with existing databases. C4FF is also involved with British Government Project DTI Technology Programme (IFOR, 2007 – 2010) developing knowledge based systems for progressive companies in the UK. The generic aspects of this model developed as a result of a PhD programme of study sponsored by C4FF, is being applied in the intended knowledge-based- system for each training module. The following tasks are being finalised:

1. Website as e-learning platform supported by LMS.
2. Establishing links to search engines.
3. Installing and setting up LMS.
4. Validating e-learning platform.
5. Adding learning material to the platform after each trial.
6. Provision of textual content with pictures.
7. Expanding questions database and provision of e-assessment.
8. Validating e-assessment.

10. CONCLUSIONS

There has been many attempts in to improve the quality and content of the Maritime Education and Training (MET), some very relevant papers in 2002 were Pourzanjani et al (2002), Schröder et al (2002); Zade et al (2002), Loginovsky (2002) followed by Ziarati in 2005 (SOS, 2005), efforts by Gregoric (EGMDSS, 2006) and Ziarati contributions to revise the MET programmes in view of emergence of automated systems on board vessels (SURPASS, 2009) actioning the recommendations of the Pourzanjani et al and Schröder et al and in 1997 taking into consideration of the MarEng and MarEng Plus (2005, 2008) findings and the work of Loginovsky (2002) in terms of developing the content and standards for Maritime English.

Maritime English is a major part of any programme of education and training for cadet officers as well as for those seeking higher qualifications such as chief mate/master and second/chief engineers. The main business of partners as a whole is the provision of merchant navy education programmes, all without exception, having a provision of some form of English preparation and some with additional unit of study for maritime English as part of the English language preparation or within the main vocational programmes. The eight active partners in this consortium as well as the silent partners numbering at the moment over twenty academic, industrial and organisations, all associated with maritime affairs believe that establishing a set of standards for maritime personnel would be highly commendable and without exception they all intend to use it. Every year thousands of cadets take some form of assessment in English language prior to commencing their main programme of education and training. In the UK there are over 4000 cadets enrolled on conventional English programmes and primarily take non-standardised tests. Those entering universities often have to achieve TOEFL 550 or IALTS 6.0 which are not directly relevant to the maritime sector. The partners also believe quality of performance and safety of the European fleet depends on maritime language skills and their correct application. A minor mistake or misunderstanding sometimes could have serious consequences in maritime transportation. An accident could lead to loss of life often with huge financial losses of income as well as subsequent legal and litigation expenditures. In one accident because the officer of watch could not understand what 'wreck ahead' meant led to a major accident.

Partners believe the EU could make a major contribution to IMO's efforts in reducing communications failures, for non-native English speakers to develop a good command of English and help to create an environment so that non-native speakers develop an ability to think in the frame of maritime profession as proposed by Loginovsky (2002). To create a set of standards the maritime profession at the right standard for the right job function would also motivate the trainees to develop an interest for the subject and take their studies more seriously. In an experiment carried out in one of the partner institutions dividing one cohort of students into two, one following a normal English Language training programme and one based on maritime English clearly showed that those on the maritime stream did far better than those on the conventional programme, and also level of motivation of the group and their attendance record were by far better than those on the normal English Language training programme. Both programmes were identical in terms of tuition hours and teaching quality and delivery methods.

Furthermore, it is not an efficient method to have the same English language programme for all classes and types of officers who have different requirements and job functions. Research has shown that the English language requirements of deck officers, for instance, are different to the English language competency requirements of the maritime Engineering officers (MarTEL, 2007). The MarTEL standards have been evaluated in four of the partner countries and results have helped to improve the initial standards proposed. The results of evaluations together with the summary of the final report to the EU will be presented at the IAMU conference and meeting in September 2009.

References

[1] Ziarati, R., "A report on IMO MSC 82 to IMarEST", for consideration to Technical Affairs Committee, IMarEST news, 2007.

[2] Ziarati, R., "Safety At Sea – Applying Pareto Analysis", Proceedings of World Maritime Technology Conference (WMTC 06), Queen Elizabeth Conference Centre, 2006.

[3] V A Loginovsky, 'Verbal Communication Failures and Safety at Sea', Vol. 2, No.2, December 2002.

[4] IMO (2005), cited in www.imo.org/human element and www.itu.edu/new/acad/tuzla/safety).

[5] IMO, 'Casualty Statistics and Investigations – Very Serious and Serious Casualties for the 2001', February 2004.

[6] MarTEL Proposal, Maritime Tests of English Lnaguage, UK/07/LLP-LdV/TOI-049, 2007.

[7] TEB, IMarEST Report, Drafted by Professor Ziarait, 2007.

[8] R Ziarati, 'Maritime and Training – A way forward', confidential report to Turkish Maritime Education Foundation, July 2003.

[9] IMO, 'sub-committee minutes', 12th session, 2004 (and 13.01.2005, www.imo.org/human element and www.itu.edu/new/acad/tuzla/safety).

[10] R Ziarati, 'Safety on Sea (SOS)', Leonardo Project 2005 – 2007, No: TR/05/B/P/PP/178 001.

[11] NTNU Report, 'Training in risk prevention and vessel safety for the coastal fishing sector', Community Vocational Training Action Programme (1995 – 1999) NORAY – Contract no. E/99/1/061291/PI/I.1.1.b/FPI.

[12] Pourzanjani et al, 'Maritime Education and Training (MET) in the European Union: How Can Maritime Administrations Support MET', Vol. 2, No. 2 IAMU Journal, December 2002.

[13] Schröder et al, 'The Thematic Network on Maritime Education, Training Mobility of Seafarers (METNET): The Final Outcomes', Vol. 3, No. 1, June 2002.

[14] Zade et al, 2002, 'Maritime Education and Training (MET) in the European Union: How Can Maritime Administrations Support MET', Vol. 2, No. 2 IAMU Journal, December 2002.

[15] Ziarati et al, 2009, Improving Safety at Sea and Ports by developing standards for Maritime English the Bridge Conference, Satakunta University, Finland, 2009.

[16] NETOSKAR – 2003, 'A Method for Continuing Development of the Competence of Sea Personnel', Project number: FIN-03-F-PP-1600016.

[17] NETOSKAR, 2003,'A Specialist Network for Development of Competence Evaluation Method on STCW 95 Functions at Maritime Sector', Contract No. FIN/03/B/F/PP-160016. [17]. Urkmez, S., 2005, 'Seafarer Shortages – Report to the chamber of Shipping'.

Part 2. PUBLICATIONS

MARITIME IT & MODERN PIRACY APPLICATIONS IN THE ROLE OF ISC MARINE SIMULATOR

Ibrahim Ghazy,
Prof. Captain, Master Mariner F.G,
BSc (Maritime Transport), MSc (Advanced Navigation)
Head of Marine Simulator
Ahmed Abd Al Maksoud,
Captain, Master Mariner F.G, BSc (Maritime Transport)
Lecturer in the Marine Simulator
College of Maritime Transport and Technology
Arab Academy for Science and Technology and Maritime Transport
E-mail: capt.ahmad@hotmail.com

Abstract. In the past few years, acts of maritime piracy have been occurring with increasing frequency in many regions of the world. Adverse effects from these attacks are suffered not just by elements of the shipping industry but, by extension to many others field in our world economical system, from that base the needs to stop that act of piracy became very important & that leads us to understand the real effective elements that help the piracy to raise again to this level.
A good observing to the pirates attacks accidents natural show us that they have **totally different** style of attacking comparing to the past old accidents. It seems that new technology advantages did have much influence over the pirate's abilities. They didn't get lazy as usual people do when they start using high tech. products. We believe that Modern pirates use a great deal of technology & from that element we will break one and big link in a **criminal chain that caused Modern Piracy Raising.**

1. INTRODUCTION:

Modern pirates use a great deal of technology. It has been reported that crimes of piracy have involved the use of mobile phones, AIS, Sat. Phone, Decoding phones tracer modern speedboats, assault rifles, shotguns, pistols, mounted machine guns, and even RGPS and grenade launchers. The Technology was useful for both sides shipping industry from a side and pirates activity from the other side, which raised the need of good handling of this technology so it will reach the right hands always. Also, we have to, increase the teacher knowledge and skills to meet the stander of awareness need for crew training to achieve optimization of this technology to be always one step forward of the modern piracy.

1.1. What is Piracy?

According to the International Maritime Bureau (IMB) the definition is: Piracy is the act of boarding any vessel with intent to commit theft or any other crime, and with an intent or capacity to use force in furtherance of that act.

1.2. The Piracy Rising Once Again:

Surveying through different research and statistics concerning reasons of pirate's attacks, we find there are three main reasons:

a) Disrupted Governmental Administration:

Food, water, energy problem is a major problem for all government now which have simply encouraged pirate attacks.

b) Reduced Naval Presence:

The trend is for smaller world navies. Dramatically decreased international ocean patrols have left merchant vessels virtually unprotected on the sea frontier.

c) Technology:

Technical advances have been reduced crew size and vessel's ability to defend itself. On the other side of the coin, there has been a bumper crop of technological advances which improve the pirate chief's weapons of speed, shock, surprise.

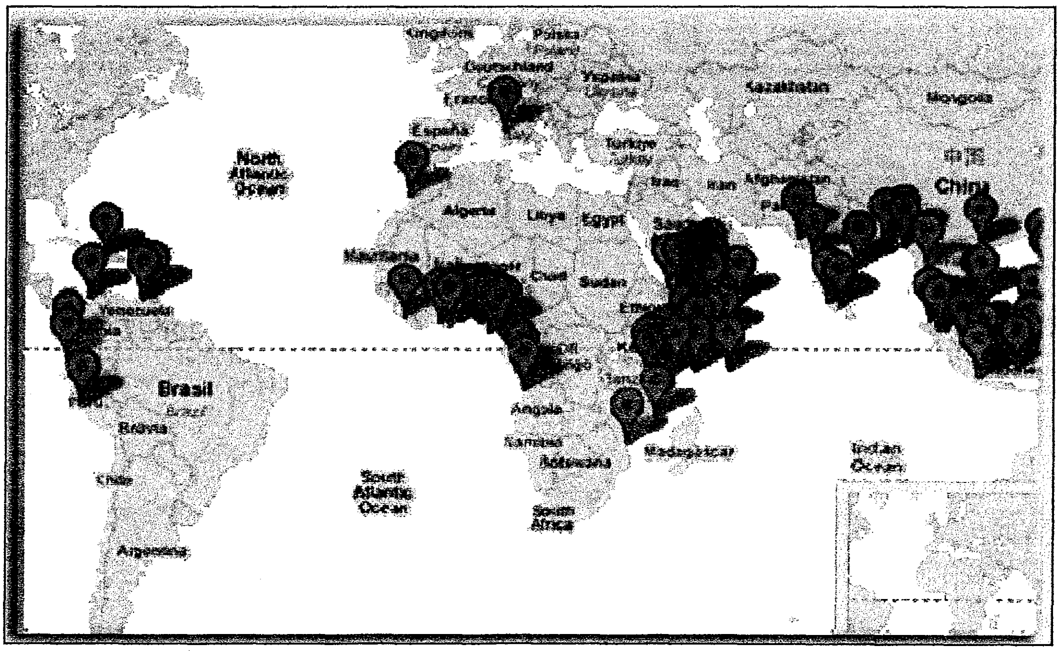
1.3. Types of Pirates:

There are three main ***Types of Pirates:***

a) *The first* type of pirate is your standard issue low-life criminal. These are types who find it more expedient to just steal your finger, instead of taking the time to remove your ring.
b) *The second* pirate type is a more sophisticated organized crime group such as the five gangs thought to control a significant percentage of piracy Area.
c) *The third* and perhaps the most troubling type is the "**Semi-Official Military Pirate**", which is the actual pirates who have merely painted their vessel to look like one of the real Coastguards also they have connections with the ports authority, ships agents, ships chartering companies to access any feedback about your ship.

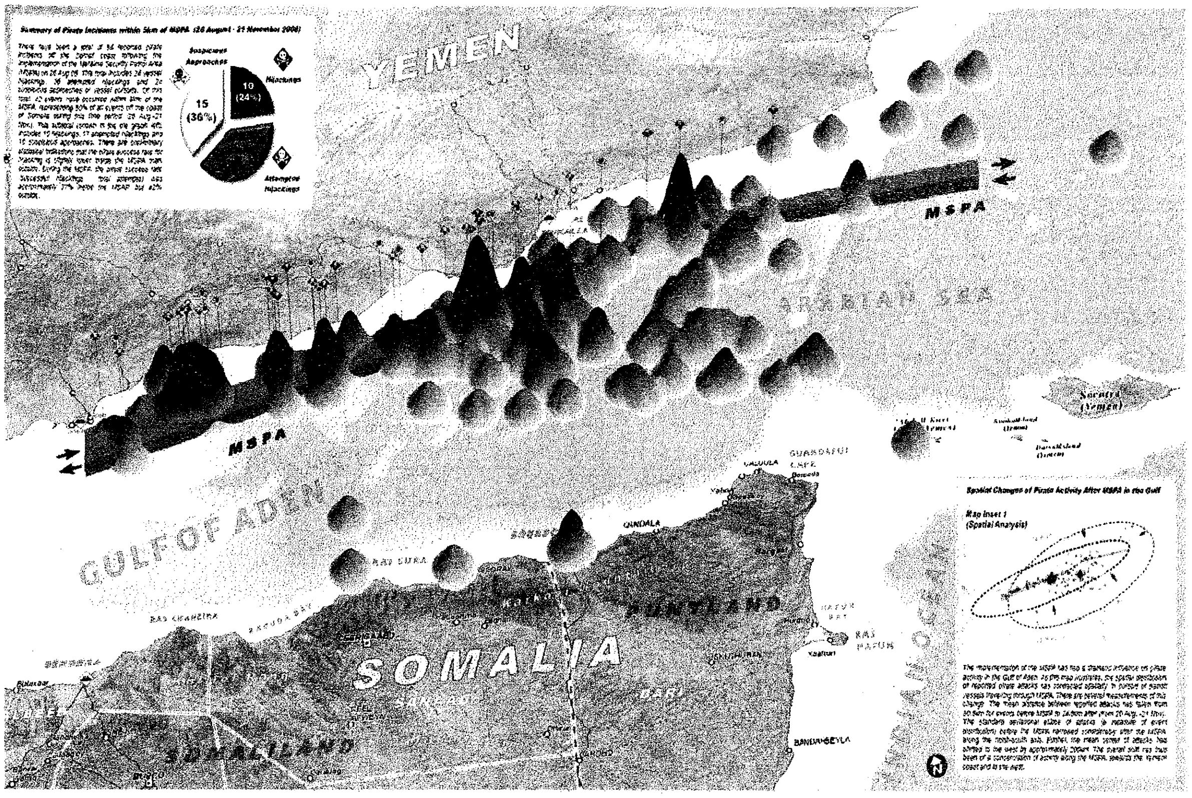
2. AN OVERVIEW FOCUSING ON PIRATES ATTACKS DENSITY

Actual pirates who have merely painted their vessel to look like one of the real Coastguards also they have connections with the ports authority, ships agents, ships chartering companies to access any feedback about your ship. Fig. 1 is a map shows all the piracy and armed robbery incidents reported to the Piracy Reporting Centre during 2008 and fig. 2.1 is a 3D perspective map illustrates the relative spatial density of reported pirate incidents in the Gulf of Aden for 2008 (current as of Nov. 21, 2008) and some Incidents that have occurred within 5km of the Maritime Security Patrol. Fig. 2.2 is a map illustrates the relative spatial density of reported pirate Incidents in the Gulf of Aden for 2008 and fig. 2.3 is a Keywords of Route.



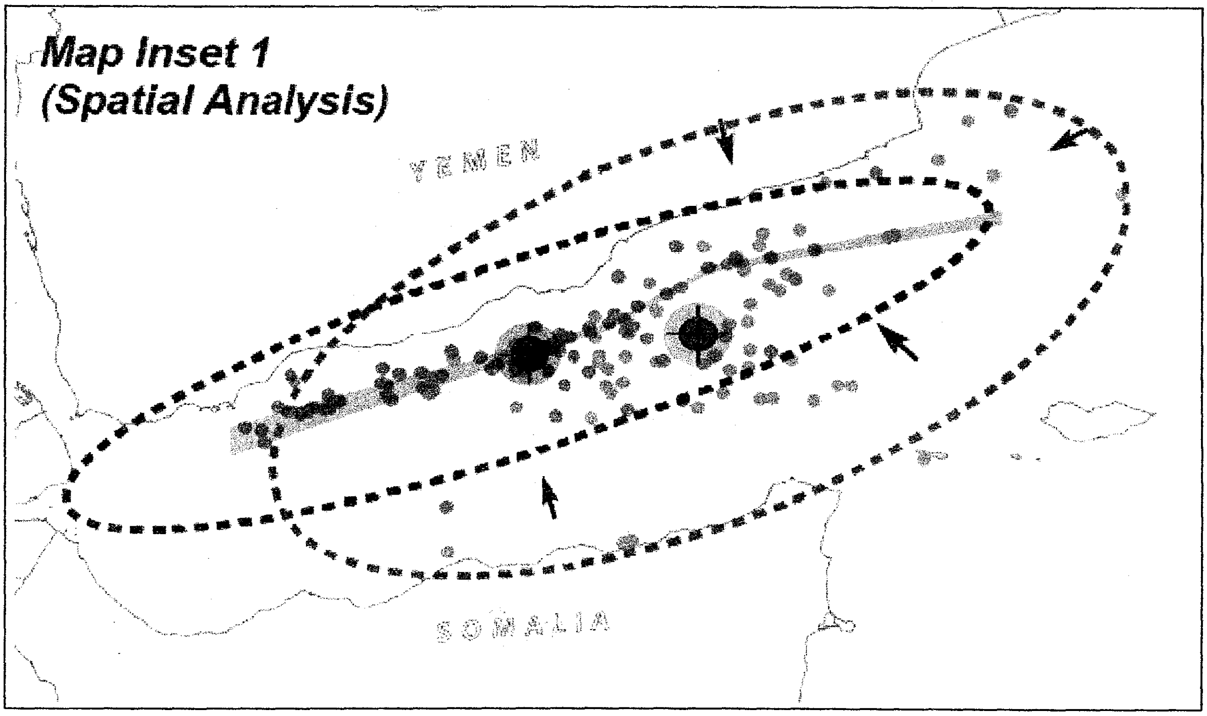
Source: NATO Research developing

Fig. 1. Region Area Attacked By Piracy 2008



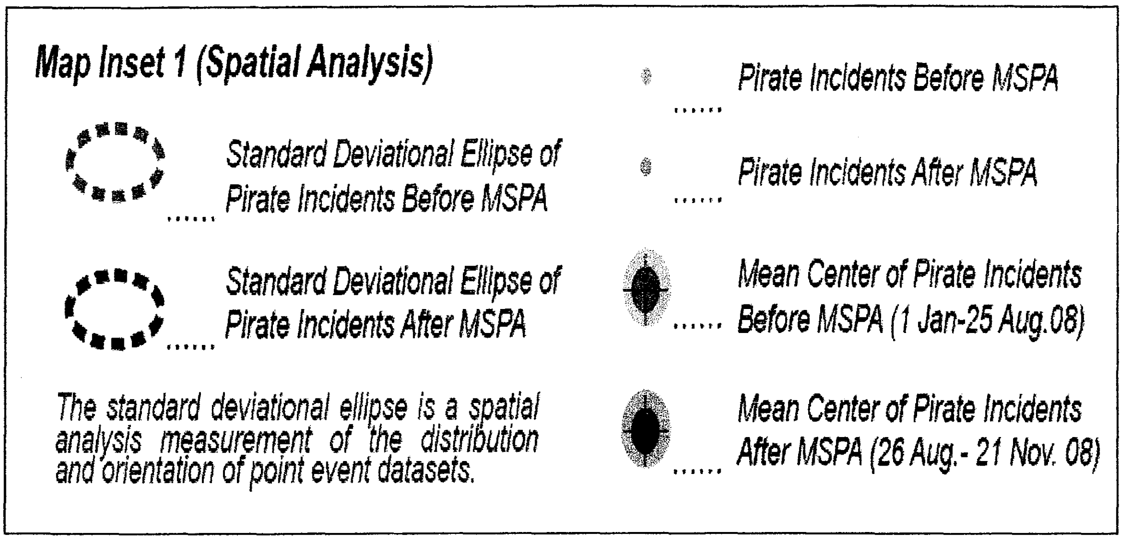
Source: UN SATCOM

Fig. 2.1. Pirates Attacks Density in the Gulf of Aden 2008



Source: UN SATCOM

Fig. 2.2. Incidents Mean Center Of Pirates Moved Toward the Center of the Marine Navy Patrols Rout!



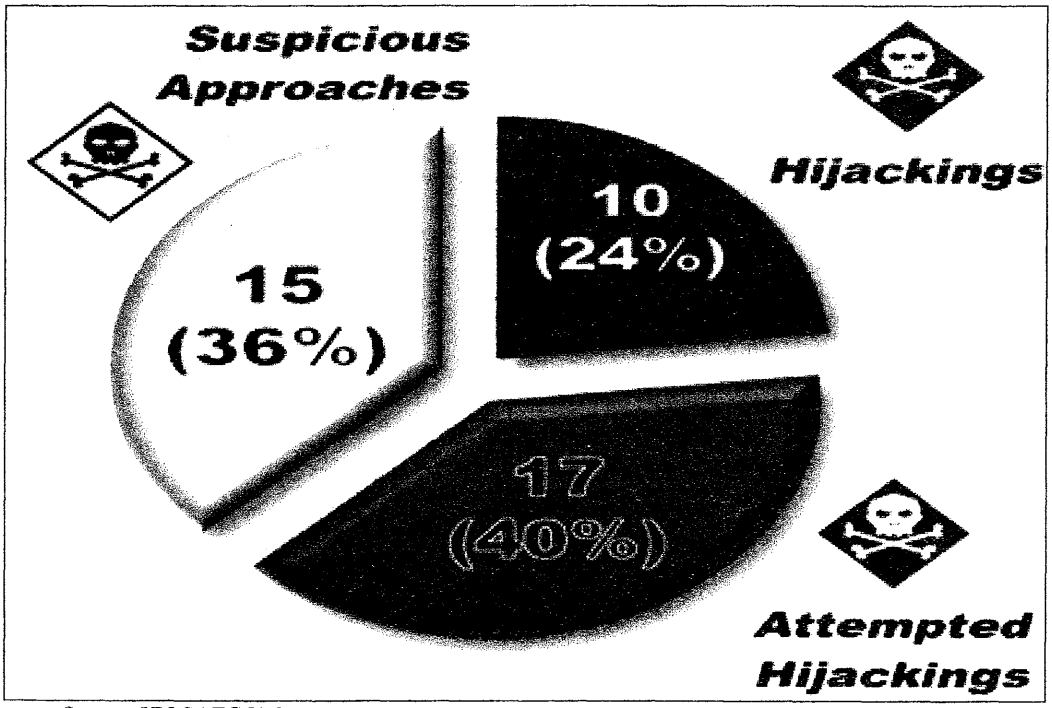
Source: UN SATCOM

Fig. 2.3. Keywords of Route

2.1. Types of Incidents:

Incidents Are Classified Into 3 Main Types:

i. **Hijacking:** where pirates have taken control of a ship.
ii. **Attempted Hijacking:** where pirates have deployed weapons & attempted to board a vessel but failed.
iii. **Suspicious Approach:** where a vessel has followed or chased another ship.



Source: UN SATCOM

Fig. 3. Types of Incidents and Percentages

3. PIRATES ATTACKERS AND USING OF INFORMATION TECHNOLOGY PIRATES STRATEGY:

The trends in latest piracy incidents are as follows:

- Targeting larger cargo / oil / gas / chemical tankers.
- Approaches / attacks conducted from 2 – 3 small speedboats with 3 – 5 armed persons each.
- Between the time you see them and the time they control the ship, it takes 15 minutes, maximum.

Pirates could be tracking their targets using modern technology that is easily available on the web and using ships identifications monitoring systems.

3.1. Marine AIS:

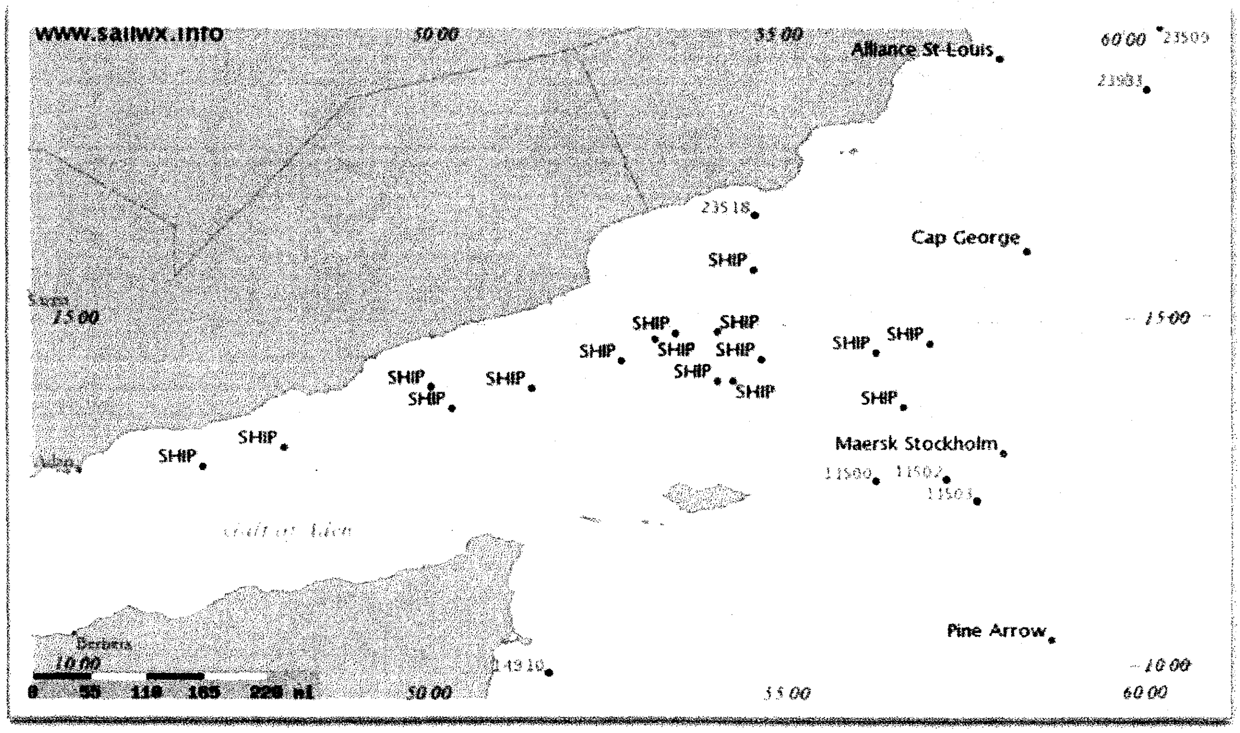
All internationally trading ships over 300 GT. were mandated under the International Maritime Organization's Safety of Life at Sea convention to install AIS and the majority of ships should be equipped with AIS by December 2004. (Merchant Shipping Notice (MSN) 1780 M).

IMO guidelines for the onboard use of AIS, resolution A.917 (22) paragraph 21 state that:

"AIS should always be in operation when ships are underway or at anchor. If the Master believes that the continual operation of AIS might compromise the safety or security of his /her ship or where security incidents are imminent, the AIS may be switched off.... The master should report this action and the reason for doing so to the competent authority."

3.2. Cargo Tracking Systems:

At least 22,000 ships pass each year through the Gulf of Aden.

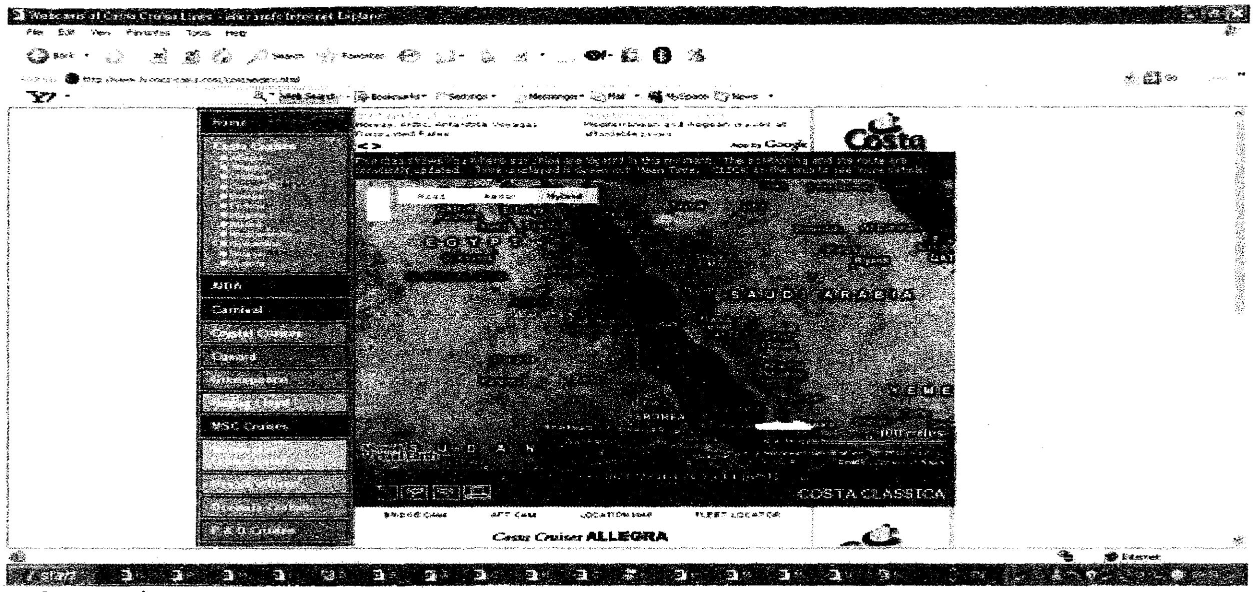


Source www.sailwx.info

Fig. 4. Cargo Tracking Systems

3.3. Just Visit the flowing Sites to get all these Information please!

Kroooz-Cams.com, Cruise-Cam.com, Shipwatching.com



Source cruise.com

Fig. 5. Internet Site and Ship's Data

Source: Time.com

Fig. 6.1. Hacker Monitoring

Source: Time.com

Fig. 6.2. Somalia Attackers

IT Without Security May Lead To…? The Right Information Reaching the Wrong Hands"

4. TECHNIQUES AND TECHNOLOGIES THAT OFFER INTERESTING TIPS FOR PIRATE-ATTACK EVASION:

4.1. What is the Solution to Piracy in Somali?

This is a vote annualized by PollDaddy answers:

(http://answers.polldaddy.com/viewPoll.aspx?view=results&id=1137237).

- Naval Escorts 21 % ;
- ***Crew Training 12 %;***
- Invade Somalia 11 %;
- Private Security Firms 14 %;
- Peaceful Entry into Somalia 4 %;
- Lethal Weapons aboard Ship 28 %;
- Non-Lethal Weapons aboard Ship 9 %.

4.2. Maritime Safety Protection Area Techniques:

Liner ships tend to do consistently is gather intelligence – whether via:

- Government organizations,
- Private security companies,
- Military coalitions or
- The insurance companies that cover their ships.

4.3. The Underlying Problems In Somalia Are:

- Political instability in the region.
- Manning of vessels.
- *Lack of specific training.*

4.4. Crew Training Methodology:

a. Ships should have a security plan that anticipates an attack by pirates. "Planning and training must be on the basis that an attack will take place and not in the belief that, with some luck, it will not happen."**Officers and crew are asked to rehearse elements of the plan"**.

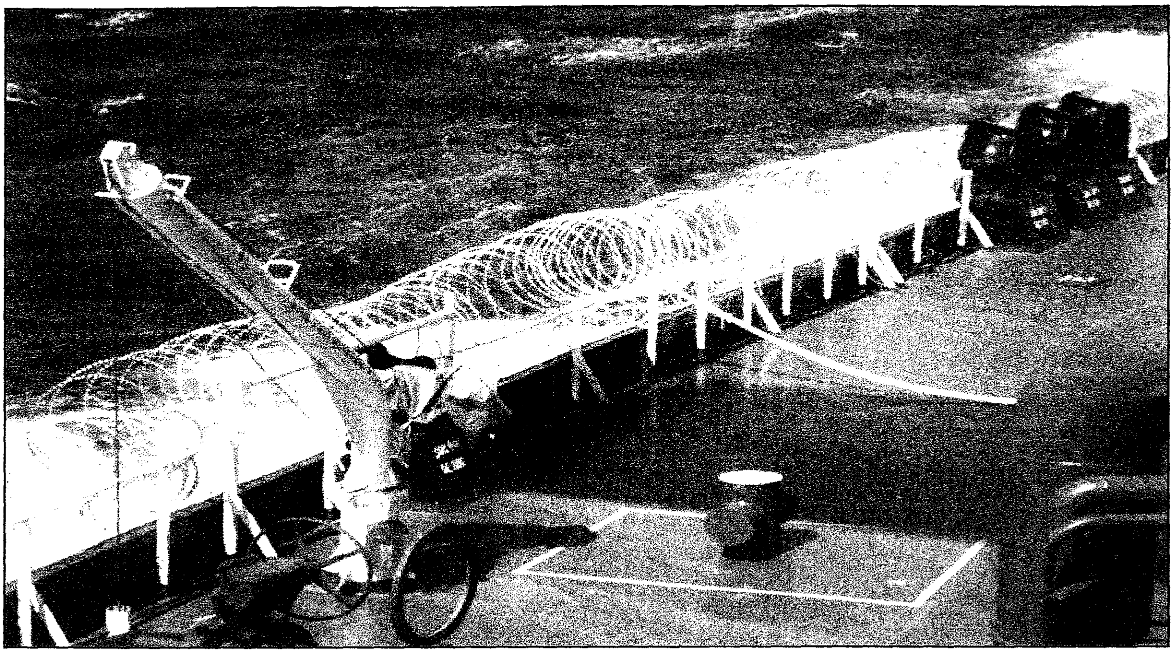
b. **Security levels referred to in the ISPS Code:**

- Security level 1: normal, the level at which the ship or port facility normally operates.
- Security level 2: heightened, the level applying for as long as there is a heightened risk of a security incident.
- Security level 3: exceptional, the level applying for the period of time when there is the probable or imminent risk of a security incident.

c. **Early detection of a possible attack is the most effective deterrent:**

The IMO guidelines stress tools to offer advance warning include:

- Low-light binoculars;
- Night vision devices and
- Barbed wire.



Source: Captain/ Ahmed Abd Al Maksoud, 2009

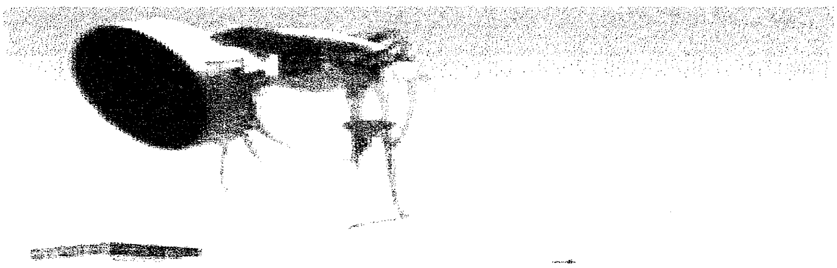
Fig. 7. Barbed Wire Rigged On VLCC Ship

d. The IMO report notes that water pressure of 80 pounds per square inch can deter attackers. Another tactic? "Provided that navigational safety allows, masters should consider 'riding off' attackers' craft by heavy wheel movements...the effect of the bow wave and swash may deter would-be attackers."

e. The GMDSS "Piracy / armed robbery attack" Message is category of distress message for all classes of DSC equipment & INMARSAT has added a piracy Message to INMARSAT-C menu for GMDSS.

f. Long Range Acoustic Device - LRAD

- LRAD – is a Long-Range hailing and warning, directed Acoustic Device designed to communicate with authority and exceptionally high intelligibility in a 15 – 30 degree beam.
- LRAD – was originally conceived to support the protection and exclusion zones around U.S. Navy warships.
- LRAD's – warning tones command attention at ranges in excess of 500 meters while it's directional and highly intelligible voice instructions can unquestionably be heard.

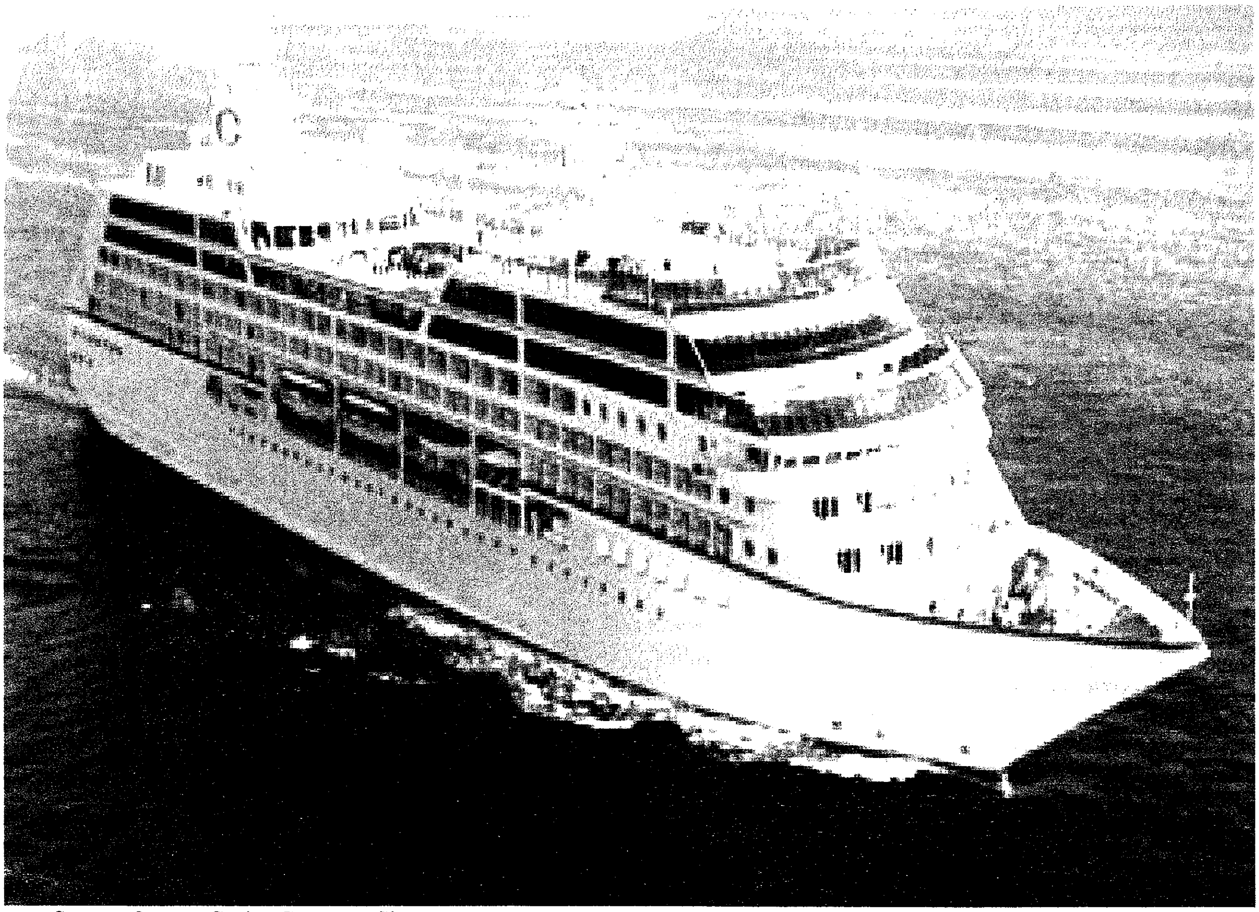


Source: www.icc-ccs.org

Fig. 7. Long Range Acoustic Device – LRAD

5. CASE TO STUDY:

MS/Nautica the large ship, carrying 656 international passengers and 399 crew members was able to outrun and outmaneuver them. The luxury cruise ship, (Nautica), Managed to avoid being Hijacked (Nov. 30. 08).



Source: Oceana Cruise Company Site

Fig. 8. MS/Nautica Managed to avoid being Hijacked (Nov. 30. 08)

The ship's Captain observed the approach of the attackers at approximately *1,000 yards* and *increased speed.* The attacking boats were able to approach within 300 yards, and *fired up* to eight rifle shots. Selection of feasible Evasive manoeuvres by judging the tip of own ship's velocity vector in relation to cone-shaped collision danger regions in true motion. It's suit more for Large-size High Speed Craft. The Master began *Evasive maneuvers* when the pirates were about 1,000 yards away from the ship and managed to avert the attack. The Ship Master used a Long-range Acoustic Device – which blasts a painful wave of sound – to distract the pirates.

MS *Nautica* Managed to Escape from the attempted attack **by:**

- Crew high awareness and
- Well trained staff leaded to ....

"A Good Reaction in a Reasonable Responding Time to Abortion That Pirates Attacks"

We are talking again about

- Training Crew,
- Good Handling of the Ships Equipment & ships maneuvers.

6. INTEGRATED SIMULATOR COMPLEX (ISC) AND TRAINING:

Marine Simulator Centers (MSC) is considered – by all standards – the most sophisticated and up to date simulation center in the world at large. It has been designed and installed by one of the leading USA companies in this field, namely "L3".

a. Ship Handling Simulator.
b. GMDSS Simulator.
c. Vessel Traffic Service (VTS).

Source: Marine Simulator Systems – AAST&MT, 2009

Fig. 9. AAST$MT Ship Handling Simulator

6.1. Objective of this Training is to achieve

- The experience of handling ships effectively and to be aware of all factors affecting the Evasive maneuver.
- Handling all majors and subtask on AIS operation which increase the mariner awareness in all the legal aspects of using AIS to prevent their ships from being a Victim to any Piracy.
- Develop the mariners to achieve the right handling of their GMDSS massage alert and skills to get the best results from there Station to prevent such a hazards.

6.2. Simulation of the Riding off Technique

A Sample of Two Scenario Run in one of the Integrated Simulation Complex (ISC) marine simulators to investigate and answer a very critical questions regarding Ridding off technique: Which Type Of Ships Can Use This Maneuvers, When and How to apply it?, and test the relation between ship's dynamic behavior and evasive maneuver technique at the study area (Somalia), the experimental method technique and different attacker's technique will be applied on a standard vessels types in the simulated study area. For the purpose of tests, a tanker ship (80000 DWT, fully loaded condition) and LNG (140.000M³ – fully loaded condition) that has a six degree of motion was used.

6.3. Feed and Results

6.3.1. 1st Scenario – Tanker 80.000 DWT Loaded

The evasive maneuver carried on 15 knots speed, it made high jacking operation difficult its observed that the chasing boat took longer time to be able to be alongside the tanker. The wave created by the evasive maneuver created a hard task for the small draft high speed boat attackers.

6.3.1.1. Maneuver Feedback Lessons

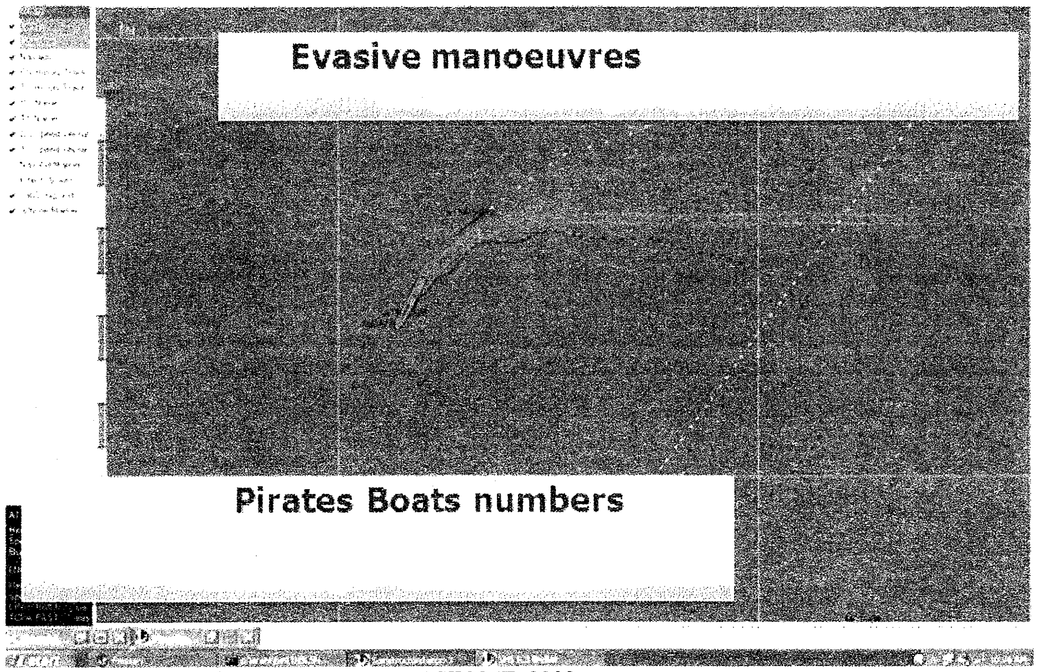
The longer the chaser will maintain the chasseing the more chances to board the victim tanker that her speed is decreasing due the maneuvers. Rate of turn for the tanker (loaded) is slowly created and slowly to be killed (overshooting), and reverse over other side to establish the evasive maneuver technique.

6.3.2. 2nd Scenario – LNG 140.000M³ Loaded

THE evasive maneuver carried on 25 knots speed; it made high jacking operation extremely difficult. It's observed that the chasing boat took too long time to be able to be alongside the tanker even for few seconds. The wav created by the evasive maneuver created a hard task for the small draft high speed boat attackers.

6.3.2.1. Maneuver Feedback Lessons

The longer the chaser will maintain the chasseing the more chances to board the victim LNG that her speed de accelerates with acceptable value for that maneuvers. Rate of turn for the LNG and reverse over other side helm to establish the evasive maneuver technique (Over shooting) was effective.



Source: Marine Simulator Systems –AAST&MT, 2009

Fig. 10. Historical Geoplot of Evasive Maneuver for LNG 140.000M³ Loaded

7. RECOMMENDATION

a) Naval force can never **eradicate piracy,** which can only be done on-land by a stable government, which Somalia hasn't had since 1991.

b) Lessons could be learnt from **successful anti-piracy** strategies elsewhere its mean Gathering Knowledge to be ready to have the right respond in the right time (As ***MS/Nautica***).

c) Targeting the so-called **"Mother Ships".** (We have to locate those mother ships by report the areas of attacks frequently to trace them).

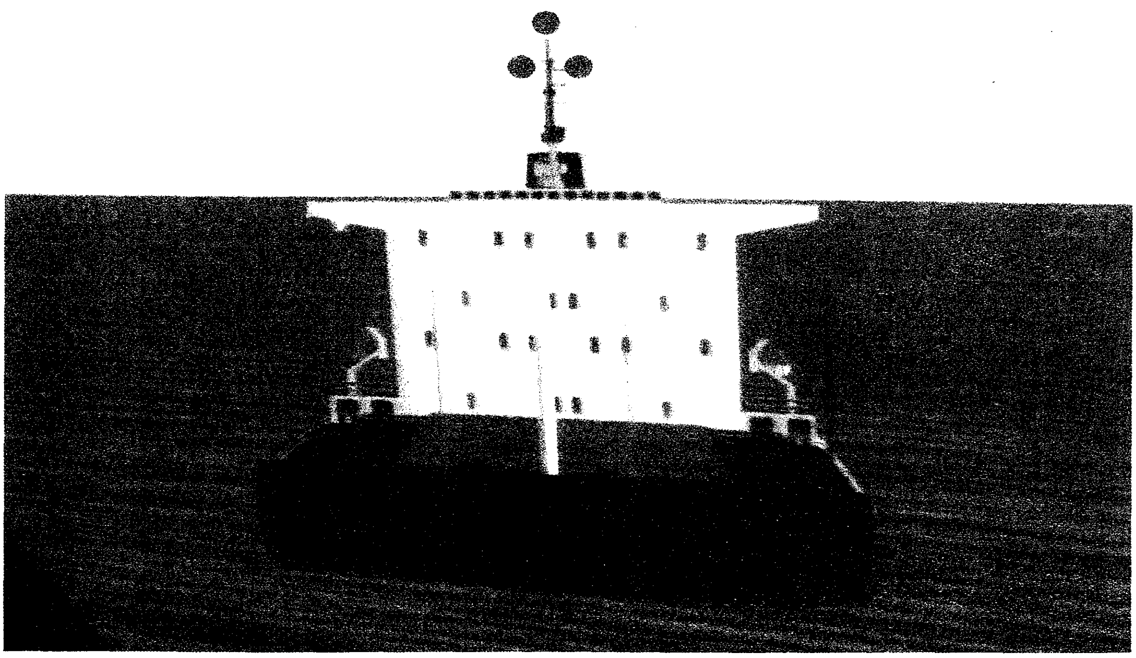
d) According to the Punt land authorities and experts, there are up to 700 foreign boats fishing illegally in Somali waters at a given time, we should start an official registration for it.

e) Involve the local community of each piracy area on the impact of having those pirates in their local community, If we will not going to we cannot achieve anything.

f) Work shop for GMDSS should established to work out on the communication tree of "piracy attacking" distress message focusing on the rule & responsibility of offshore and onshore parties.

g) A work shop to rehash the Rules of the Conduct Of Vessels in condition of piracy attackers such as Lights and Shapes (Rules 20 – 31) Sound and Light Signals (Rules 32 – 37).Example: A vessel facing pirates attacks shall exhibit:

- Three all-round round lights (night) or diamonds one at the mast head, one on each yardarm.
- It's also a Useful singe for the ships in the Area, Navy ships, Patrol Air Planes, to Declare that This Vessel is being High jacked or under pirates attack.



Source: Marine Simulator Systems –AAST&MT, 2009

Fig. 11

MARITIME IT & MODERN PIRACY

References

- Arab Academy for since and technology "Marine Simulator" (ISC).
- The half yearly report (Feb - July 2009) from the NATO Shipping Centre.
- IMB Piracy Reporting Centre "Official Web Page".
- Counterfeiting Intelligence Bureau "Official Web Page".

THE FREE MOVEMENT OF SERVICES (AND THE LIBERALISATION OF MARITIME SERVICE SECTOR) IN THE EUROPEAN UNION (EU): THE LIMITS OF INSTITUTIONAL STEPS FROM ABOVE

Levent Kirval,
Asst. Prof. Dr.
Maritime Faculty
Istanbul Technical University
Email: lkirval@itu.edu.tr

Abstracts. This paper gives an account of the historical development of the free movement of services (including the maritime service sector) in the EU and it also focuses on the limits of institutional steps taken by Brussels in further advancing liberalisation of the Single Market. By moving on from the consensus that is achieved in the multilateral trade negotiations of General Agreement on Trade and Tariffs (GATT) and The General Agreement on Trade in Services (GATS), the EU member states have taken further measures to deepen the economic integration with a view to create a single market by means of free movement of goods, services, capital and labour. However, the free movement of services (and to a certain extent the free movement of labour, due to the cultural differences, the problems in mutual recognition of diplomas and the language problems) have remained limited; although the European institutions have taken various measures and developed the relevant parts of the *Acquis Communautaire* in time. In this context, this paper will elucidate why the services sector is lagging behind within the Single Market, and it will also offer several steps to further deepen the economic integration in this field.

1. INTRODUCTION

Trade has always been an important part of the lives of societies and has influenced the development of cultures. Human beings, by using the goods and services they have produced as a surplus value, have always searched for ways to increase their income. As a result, trade, which was once an activity between cities, has exceeded the boundaries of the states. Port cities have quickly developed and the level of prosperity of the societies that were engaged in trade activities has also increased. The impetus behind the discoveries during the 'middle ages', and the efforts of colonisation that followed, has again been trade.

Firstly, the mutual trade of goods increased between the societies and the states. Yet, in parallel with the increasing needs, the services sector has began to have a trading aspect. People at first thought that this field was not suitable for trading activities. Unlike the trading of goods, in the trade of services, it has been thought that there has to be a direct connection between the service supplier and the person who gets the service. As a result, trade in services is considered as a field that would not have an important place in international trade. However, the existence of transportation as a service sector for centuries quickly proved the shortcomings of this view. And today, 20 % of the world trade is composed of the services sector and as a result of the developing communication technologies; its share is further increasing.

The increase in international trade has also caused various problems in international relations. Global arrangements became very important especially after the World War II as they would eliminate the negative effects of increasing competition and further expand the trade activities. The aim was to create binding rules for trade and further liberalise the world markets.

These efforts to liberalise the trade between states are also visible today within the regional and global political institutions such as the Word Trade Organization, the EU, NAFTA, ASEAN and MERCOSUR. The legal framework of these political structures is detailed in various international agreements.

2. TRADE LIBERALISATION: GENERAL FRAMEWORK

General Agreement on Trade and Tariffs (GATT)

After the Second World War, although there existed a continuing belief in the idea that international trade is important for economic development, the countries decided to create multilateral rules for trading due to the lessons learned from the mercantilism of the previous decades. In this context, after having discussions on tariffs and products, 23 countries signed the General Agreement on Trade and Tariffs (GATT) in Geneva on October 1947. In order to develop international trade, GATT has aimed at the gradual decrease in the custom duties and quantity restrictions, and this agreement is generally regarded as the most important step in the liberalisation of the world trade.

Historically, the most important difficulty that is faced during the international trade activities has been the restrictions and the barriers that countries implement towards each other or a third country[1]. The most widespread of theses barriers are the custom duties and quantity restrictions that the countries apply to foreign origin goods. With the custom duties, the countries decrease the competition chance of the goods entering to their markets and in that way they create a preferential environment for their own producers. In the same way, with the quantity restrictions, the countries give permission to imports in very limited quantities and for certain number of goods. As both the custom duties and quantity restrictions formed an important barrier to international trade, GATT has aimed to gradually remove all these.

Overall, GATT is formed on four main principles, which can be summarized as; The Most Favored Nation Clause, the National Treatment Clause, the Consolidation of the Custom Duties Clause, and the Sole Protection by Custom Duties Clause. In the context of 'The Most Favored Nation Clause', the signatory countries accepted that they, immediately and without any conditions, will implement their most favored nation treatment to the goods and good suppliers of all other countries. However, countries would also be able to define some derogation lists in the areas where they wish to implement different treatments. In the context of The National Treatment Clause, signatory countries confirmed to implement the same treatment, which they implement to their own good suppliers, to all the foreign good suppliers. The Consolidation of Custom Duties Clause aimed liberalisation and harmonization in the long run. And the Sole Protection by Custom Duties Clause aimed at eliminating the non-tariff barriers. (Such as procedural hurdles that are created by national bureaucracies for foreign good suppliers in their entry to the market.)

The scope of GATT has developed in time with the GATT rounds and with the participation of more countries. On the whole, strengthening of international rules for trade has been the main aim of all Rounds. Eight multilateral rounds have been concluded up to today, and these are shown below.

Table 1

GATT Rounds

Rounds	Year	Agenda	Nr. of Participant Countries
Geneva Round	1947	Tariffs	23
Annency Round	1949	Tariffs	13
	1951	Tariffs	38
Geneva Round	1956	Tariffs	26
Dillon Round	1960 – 1961	Tariffs	26
Kennedy Round	1964 – 1967	Tariffs, anti-damping	62
Tokyo Round	1973 – 1979	Tariffs, non-tariff barriers, framework agreements	102
Uruguay Round	1986 – 1994	Tariffs, non-tariff barriers, framework agreements, services, intellectual property rights, solution of disagreements, textiles, agriculture, setting up of the WTO	123

In the meetings of the Dillon Round (1960 – 1961), the common custom duties implemented by the newly established European Economic Community (EEC) to the third countries have been heavily discussed, but a consensus could not be achieved. Only with the Kennedy (1964 – 1967) and Tokyo Rounds (1974 – 1979) the custom duties could be pulled down internationally to an average ratio of 35 %. However, most of the rules implemented in international trade today have been set in the Uruguay Round and it continued more than seven years. The GATT multilateral trade negotiations began in September 1986 in Uruguay and finished on the 15th of December 1993. The Final Draft, which was signed at the end of Uruguay Round negotiations, is composed of agreements, compromises, decisions and declarations. The Final Draft also included the binding confirmation lists prepared by the participating countries, which aimed to decrease and eliminate the tariff and non-tariff barriers.

In the Uruguay Round besides the trade in goods, other subjects such as the trade in services, intellectual and industrial property rights and investments influencing the trade have also been discussed. At the end of the Uruguay Round, 29 agreements and compromises have been accepted as a package. By these agreements the schedule for the mutual liberalisation by countries and country groups has been determined. As a result of the Uruguay Round, the signatory countries of GATT have also decided to transfer all of their trade related rights to the newly formed World Trade Organization (WTO).

WTO began its activities on 1st of January 1995. Today, more than 150 countries are full members of the WTO. The members, in the framework of international agreements embodied in the WTO; aim at creating a system where the countries do not have differentiated treatments towards each other in trading activities. In that framework, the rules that WTO has determined for the liberalisation and the development of the world trade can be summarized as: non discrimination in tariff implementations, the multilateral reduction of custom tariffs, the removal of import quotas and the acceptance of WTO's mediation in trading disputes by the member states.

Surely, the most important agreement within the WTO is GATT. The appendixes of GATT also includes subjects like trade in goods, product standards, subventions and steps to be taken towards anti-damping activities. However, the 'trade in services', which covers a large area from banking to insurance, communication to tourism, transportation to architectural activities, by another international agreement in the framework of WTO; namely the General Agreement on Trade in Services (GATS). The importance of the trade in services has increased and gained an international dimension in the last decades due to the growth in the foreign direct investments, internationalisation of labour, increasing transportation activities between countries and the newly developing services based on information and communication technologies. In this context, GATS has taken its place in the appendixes of the Final Act that was signed after the GATT's Uruguay Round at Marrakech and came into force on 1 January 1995.

General Agreement on Trade in Services (GATS)

GATS is the first multilateral agreement that regulates international trade in services. However, the clear-cut definition of the 'service' term has not been given within GATS, for not excluding possible service sectors that can emerge in the future as a result of the developing technology. Therefore, all the services excluding the 'sectors that governments provide without trading purposes and without competition with other service suppliers' are included to the agreement. Within GATS, international trade in services has been mainly regulated under 11 major headings. These are; professional services, communicational services, engineering and architectural services, distributional services, educational services, environmental services, fiscal services, health and social services, cultural services, services about tourism and travel, transportation services (maritime and others) and other services (such as energy distribution services).

The agreement's main text contains the general rules for international trade in services and the duties of the signatory countries. In also contains the commitment and derogation lists of the signatory countries about the opening of their service markets to service suppliers. With the commitment lists, the countries (after giving in detail the actual restrictions in the concerned areas) commit themselves for not creating further restrictions. The derogation lists contain the names of the countries, which the signatories will have different trading treatments. In this context, 95 member states have presented their commitment lists in the area of services and 61 member states have presented their derogation lists in the framework of "the Most Favored Nation Principle" in the Final Document, signed after the Uruguay Round in 15th of April 1994.

GATS also prevents the withdrawal of the signatory countries from the liberalisation agreements, which they signed for the trade in services. According to the agreement, if a country that has a commitment in one of the service sectors wants to pull back his commitment, it is responsible to pay for all the losses of the countries which are negatively affected by this situation.

Signatory countries of the GATS also called for regular future rounds to increase the commitments of countries and achieve more advanced liberalisation in the services sector. Article 9 of the GATS stated that a new round should take place no later than 5 years after the entering into force of the agreement. In this context, the new round of GATS discussions began on the January of 2000 in Geneva, but as the number (and determination) of participating countries to this round was not as big as the Uruguay Round, there have not been major advancements in the liberalisation of trade in services.

Today, the restrictions to trade in services generally take place in two ways. The first of these can be examined under the title of "measures affecting the entrance of the supplier to the market". With these measures, the countries are forming barriers against the entry of foreign service suppliers to the national markets. The quotas put on imported services, the necessity of licenses and diplomas in providing services, and residence and working permit requirements can be given as examples to this. The other group of restrictions in services can be named as "national treatment measures" and these can be examined in two subgroups. In the first camp the cost of the domestic services supplier is reduced with the direct state subsidies, where as in the second camp the costs of the foreign service suppliers are increased with various measures. The necessity for foreign banks to provide a higher rate of reserve when compared with national banks, or their responsibilities to pay higher taxes can be given as examples for this. All these aim to form an environment that favours the domestic producer by decreasing the competitiveness of the foreign service supplier.

These measures make the entry of foreign service suppliers to the national markets very difficult. Therefore, GATS is characterized as the most important step taken for the gradual removal of these types of measures. The signatory countries have aimed at determining the actual situation in the area of services first, and following that, they taken steps to prevent the development of similar barriers in the future.

With GATS, the countries have formed their lists of commitments and derogations in 4 major 'Service Modes'. 1st service mode is the "cross border trade in services", 2nd service mode is the "services consumed abroad", 3rd service mode is the "right to provide a service in a foreign country" and the 4th service mode is the 'services given via the movement of real persons".

1st Service Mode – cross border trade in services: In the framework of this service mode, signatory countries lists the countries with which trading in services is possible. Examples to that kind of trade in services are the transportation services, the reservation of tickets and touristic trips by the internet and other telecommunication technologies.

2nd Service Mode – services consumed abroad: In the framework of this service mode, signatory countries lists whether their citizens can or can not receive the services provided abroad. The widest among these kinds of services is the travel of the individuals to other countries and the consumption of the services in these countries.

3rd Service Mode – right to provide a service in a foreign country: The entry of any service supplier to the national market and whether he/she can or can not form a trading entity by opening a company, branch or an agency is detailed in this service mode. The Countries party to the GATS have determined to which service suppliers they will provide the right to settle.

4th Service Mode – the services given via the movement of real persons: In the framework of this service mode, the regulations for the staff of the foreign companies, which have the permission in the framework of 3rd Service, are given. Signatory countries detail the conditions for the foreigners to supply services.

Broadly, the trade in services has been regulated in the context of these service modes within GATS, and the signatory countries have given clearly their commitments and derogation lists for these service modes. A large derogation list of one signatory country shows that this country does not provide a liberal environment in that area. Yet, because of the differences in service sectors of the countries and their varying economic development levels, none of the countries have given promises to liberalise all the service sectors.

3. LIBERALISATION OF TRADE IN SERVICES IN THE EU

Article 2 of the GATS contains the 'most favoured nation' clause that states that each member state will immediately and without any condition implement a treatment not less differentiated than the one it has implemented to its most favoured country, to any other member's services and service suppliers. In the agreement, the exception of this rule has been given under the Article 5 titled 'Economic Integration'. Here, it states that the signatory countries of GATS may form a group to further develop the liberalisation. In this context, the steps that are taken in the EU for further liberalisation of the services sector are taken in accordance with the GATS.

From beginnings of the European integration up to today, the EU member states have taken steps to create free movement in four major economic areas. The belief here was that the economic integration would facilitate the political unity. These are: the free movement of goods, the free movement of services, the free movement of capital and the free movement of labour.

Of these, the free movement of services in the EEC has been first mentioned in the 59 – 66th articles of the Rome Treaty which came into force on 1 January 1958. Here the term service is used for industrial, commercial and professional services in the Community. By these articles, the gradual removal of the different implementations and restrictions within the Community (following the transition periods) has been decided upon. These articles also underlined that the service providers can continue their activities in the member states for a given period of time and during this period they will have the same rights with the nationals of those countries. These articles also permitted the member states to go beyond the regulations in the implementation phase, if their economic conditions allowed it. As a rule, the services had to be provided within the member states, whereas the supplier and the buyer of the service could reside in different countries. However, after the ending of the service, the supplier or the buyer of the service had to return to his/her country, the services should not have been given freely, and the service had to have a temporary characteristic.

The Rome Treaty has stated that the member states have to protect the level of liberalisation after the Treaty's entry into force. Article 62 has detailed this in the framework of the Standstill rule:

"Member states, concerning the free movement of services, can not put new restrictions to the liberalisation level attained, after the coming into force of this agreement".

As the article created a direct effect on the EU member states about their internal regulations, they could not take legal steps to limit the movement of services after the signing of the Rome Treaty. On the other hand, the timetable and the method of removing existing restrictions have been stated in the Article 63 of the Treaty.

First paragraph:

"Before the ending of the first period, the Council, with the proposal of the Commission, after consulting the Economic and Social Committee and the General Assembly, decides on the General Program for the

removal of the restrictions on service acquirement by unanimity. The Commission presents this proposal to the Council in the first two years of the first period. The Program determines the general conditions and periods of the freedom for each branches of service".

Second Paragraph:

"For the implementation of the General Program or in case of the absence of that program, for the implementation of a phase to liberalise a particular service, the Council; with the proposal of the Commission, after consulting the Economic and Social Committee and the General Assembly drafts directives (after the fist period) first by unanimity then by qualified majority".

In this context, the Council of the EU, with the authority coming from the articles of the Rome Treaty cited above, has prepared a General Program on the free movement of services for the EEC, on 18 December 1961.[2] With the so called program, general principles about the removal of the restrictions on the free movement of services have been decided upon.

The General Program, which was the first general regulation about the free movement of services in the Community, has foreseen the removal of all the favouritisms related with citizenship related laws. In the Program, it has also been stressed that all steps for the liberalisation of trade in services should be taken in coordination. The periods in this program were:

1st period: 1 January 1962 – 31 December 1963;
2nd period: 1 January 1964 – 31 December 1965;
3rd period: 1 January 1966 – 31 December 1967;
4th period: 1 January 1968 – 31 December 1969.

The EEC has aimed to gradually remove all the unfair regulations that existed in the laws of the member states with regards to various service sectors. In the first period, the existent restrictions on the industrial activities, the wholesales and the commercial representatives' activities have been removed. The restrictions in retail sales and food industry would be removed in the second period. Cleansing of the member states' laws from the regulations containing discrimination about self-employment activities (such as doctors, nurses and pharmacists) could only be improved in the third and fourth periods. In the Treaty of Rome, the 12 year transition period (1958 – 1970) of the Customs Union has also been targeted for the removal of the restrictions in trade in services. Undoubtedly, the main idea was the coordinated development of the regulations about the free movement of goods, services, capital and labour. But there have been important difficulties in deciding when to liberalise various service sectors. It can be said that even today a full liberalisation could not be achieved for in service sectors (one important sector being the maritime transportation).

In the transition from the EEC to the EU, as in many other areas, there have also been changes in the regulations about the free movement of services. Especially the 63rd article of the Rome Treaty that detailed how the restrictions on the free movement of services should be removed has become the 52nd article of the Amsterdam Treaty as:

For the liberalization of a particular service, the Council with the proposal of the Commission, after consulting the Economic and Social Committee and the General Assembly, drafts directives by qualified majority.

As a result, the Council of the EU has enacted directives and regulations whose technical details have been determined by the Commission and on which European Parliament has given its view in the following years. The majority of these directives in those years regulated in detail the self-employment activities in the services sectors.

In liberalisation of the trade in services the 'Right of Residence' is crucial. In this context, the regulations about the free movement of labour and right of residence are also related with the free movement of services. The right of residence provides the right to establish work and provide a service to an EU national. The basis of that mentioned right has been established with the 52 – 58th articles of the Rome Treaty and with these articles the EU member states have affirmed that they will gradually remove the restrictions related with the residence issues.

From its beginnings, the principle of non-discrimination due to citizenship (for EU nationals) has been one of the basic principles of the EU. In this context, the right of residence and working within the Union in another member state has been possible with the view that the free passage of persons from one country to another is necessary for further deepening of the common market. Moreover, European Social Policy which developed again in parallel with the same principle has provided the member states' citizens the opportunity to work under more or less equal conditions within the EU.

The examples of the regulations that form the general legal framework in the free movement of labour and residence, which are also crucial for providing basic services within the EU, are given below:

I – Council Directive 85/384/EEC of 10 June 1985 on the mutual recognition of diplomas, certificates and other evidence of formal qualifications in architecture, including measures to facilitate the effective exercise of the right of establishment and freedom to provide services (OJEC L 223, p. 0015 – 0025, 21 August 1958).

II – Council Directive 64/221/EEC of 25 February 1964 on the coordination of special measures concerning the movement and residence of foreign nationals which are justified on grounds of public policy, public security or public health (OJEC B 056, p. 0850 – 0857, 4 April 1964).

III – Council Directive 73/148/EEC of 21 May 1973 on the abolition of restrictions on movement and residence within the Community for nationals of Member States with regard to establishment and the providing of services (OJEC L 172, p. 0014 – 0016, 28 June 1973).

IV – Council Directive 77/249/ EEC of 22 March 1977 to facilitate the effective exercise of lawyers to provide services (OJEC L 078, p. 0017 – 0018, 26 March 1977).

V – Council Directive 89/48/ EEC of 21 December 1988 on a general system for the recognition of higher-education diplomas awarded on completion of professional education and training of at least three years' duration (OJEC L 019, p. 0016 – 0023, 24 January 1989).

VI – Council Directive 90/364/EEC of 28 June 1990 on the right of residence (OJEC L 180, p. 0026 – 0027, 13 July 1990).

VII – Council Directive 90/365/EEC of 28 June 1990 on the right of residence for employees and self-employed persons who have ceased their occupational activity (OJEC L 180, 13 July 1990).

With the legal steps such as above, it has been possible for the member states' citizens to get the right of free movement and residence. These regulations have also been crucial in the increasing ratio of the trade in services within the EU. According to the data of the WTO, today, 60 % of the total trading of the 46 economically notable countries is formed by the services sector. And the EU is in the position of the world's greatest service provider. The EU has the 25 % of the world trade in services; this ratio is 22 % for the United States and 7 % for Japan.

As it can be easily seen in Tables 2, 3 and 4, services sector is crucial for the economies of the EU member states. However, it is not still possible to say that all the restrictions on trade in services have totally been eliminated within the EU. When observed closely it appears that a large part of liberalisation have taken place in the financial services. Again, in telecommunications, transportation (excluding maritime and air transportation) and energy sectors, one can see the free movement of services to some extent. The level of liberalisation in the trade in services is also visible in the associated parts of the *Acquis Communautaire.* In this regard, some of the major regulations of the different sectors are given below.

Table 2

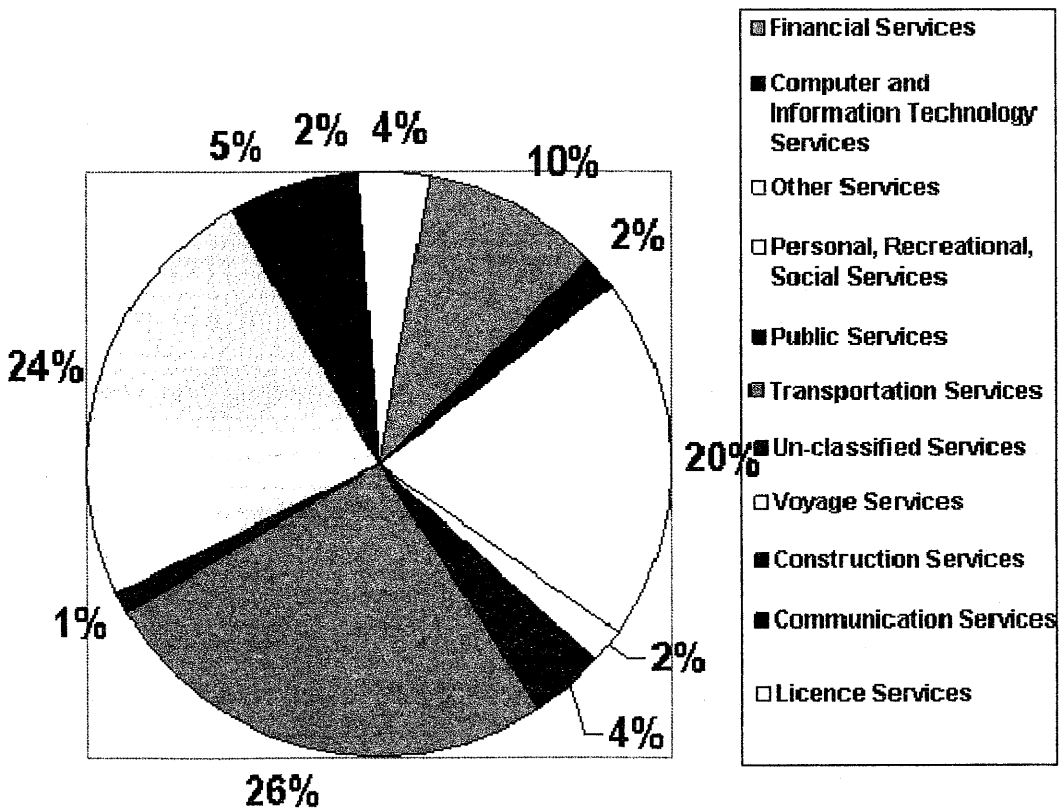
Service Sectors of the EU Member States (% of GDP – 2005 prices)

	Agriculture	Industry	Services - Private (Construction Included)	Services - Public
Germany	1,3	22,8	51,1	19,7
Austria	2,3	22,6	50,6	18,6
Belgium	1,7	22,5	47,7	21,4
Denmark	3,3	16,3	46,3	23,1
Finland	3,5	27,0	41,0	18,2
France	3,1	19,2	48,3	21,3
Holland	3,1	19,4	50,2	20,2
England	1,5	21,9	50,4	19,3
Spain	4,4	21,3	50,0	18,9
Sweden	2,1	24,6	45,0	21,0
Italy	3,1	23,2	50,2	17,4
Luxembourg	0,8	15,0	66,0	16,8
Portugal	4,5	21,2	47,2	21,4
Greece	8,2	14,4	51,6	17,3

Source: Eurostat

Table 3

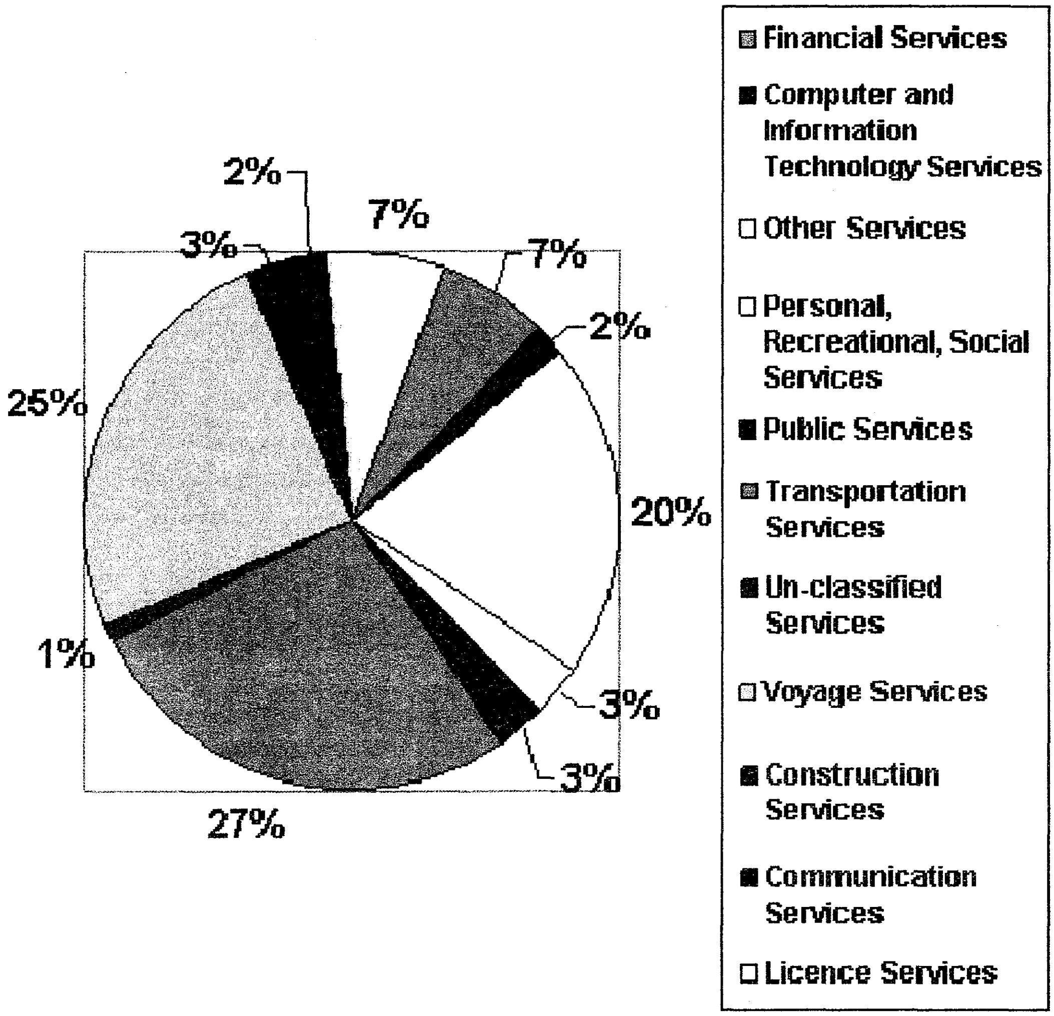
EU Member States' Exports in Services (Sectoral Ratio)



Source: Eurostat

Table 4

EU Member States' Imports in Services (Sectoral Ratio)



Source: Eurostat

General Regulations about Trade in Services

I – Council Directive 63/340/EEC of 31 May 1963 on the liberalization of payments concerning trade in services (OJEC 086, p. 1609, 10 June 1963).

II – Council Directive 63/607/EEC of 15 October 1963 concerning the liberalization of film industry (OJEC L 159, pp. 2661 – 2664, 2 November 1963) (has undergone changes several times).

III – Council Directive 64/222/EEC of 25 February 1964 on the abolishment of the restrictions concerning the sector of wholesales, commercial and intermediate services (OJEC 056, pp. 857 – 859, 4 April 1964).

IV – Council Directive 63/224/EEC of 25 February 1964 on the abolishment of restrictions concerning retail sales and the trade of hand made products (OJEC 056, pp. 869 – 873, 4 April 1964).

V – Council Directive 64/225/EEC of 25 February on the abolishment of restrictions on the sector of reassurance services (OJEC 056, pp. 878 – 880, 4 April 1964).

VI – Council Directive 64/220/EEC of 25 February on the abolishment of restrictions concerning the financial services (OJEC 056, pp. 878 – 880, 4 April 1964).

VII – Council Directive 64/221/EEC of 25 February 1964 on the coordination of special measures concerning the movement and residence of foreign nationals which are justified on grounds of public policy, public security or public health (OJEC 056, pp. 850 – 857, 4 April 1964).

VIII – Council Directives 64/427/EEC, 64/428/EEC, 64/429/EEC of 7 July 1964 concerning the abolishment of restriction about the service supply of various small scale enterprise groups (OJEC 117, pp. 1863 – 1892, 23 July 1964).

IX – Council Directive 65/1/EEC of 14 December 1964 concerning the abolishment of restrictions on agricultural and gardening services (OJEC 001, pp. 001 – 006, 8 January 1965).

As stated before, the Member states are responsible to harmonise their national legislations in parallel with these regulations.[3] The number of regulations about the free movement of services enacted during the transition period of the EEC, and the service sector itself has continued to develop in time. Some examples to these regulations are given below:

I – Council Directives 75/368/EEC and 75/369/EEC of 16 June 1975 concerning the temporary precautions, that are necessary to take in the free movement of services in various sectors (OJEC 167, pp. 22 – 30, 30 June 1975).

II – Council Directive 89/48/EEC of 21 December 1988 on mutual recognition of graduate diplomas (OJEC 019, pp. 16 – 23, 24 January 1989).

III – Council Directive 92/51/EEC of 18 June 1992 concerning the professional education and internships (OJEC 209, pp. 0001 – 0024, 24 July 1992).

Besides these regulations that are related with the general aspects of free movement of services, directives about various service sectors have also been enacted. Examples of these are given below:

Regulations concerning the Agricultural Services

I – Council Directive 67/532/EEC of 25 July 1967 concerning the plantation in the EU member states (OJEC 190, pp. 0005 – 0007, 10 July 1967).

II – Council Directive 67/531/EEC of 25 July 1967 concerning the freedom of nationals of EU Member States to enter agricultural cooperatives in the states they reside (OJEC 190, pp. 0003 – 0005, 10 July 1967).

III – Council Directive 67/654/EEC of 24 October 1967 concerning the services given by self-employed in forestry activities (OJEC 263, pp. 006 – 010, 30 October 1967).

IV – Council Directive 68/192/EEC of 5 April 1968 concerning freedom of access to the various forms of credits for EU nationals to establish farms in the EU (OJEC L 093, pp. 0013 – 0014, 17 April 1968).

Regulations concerning the Insurance Services

I – Council Directive 72/166/EEC of 24 April 1972 concerning the insurances of motor vehicles (OJEC L 103, pp. 0001 – 0004, 2 May 1973).

II – Council Directive 73/240/EEC of 24 July 1973 concerning the basic insurance services (OJEC L 228, pp. 0020 – 0022, 16 August 1973) (has undergone changes for several times).

III – Council Directive 56/580/EEC of 29 June1976 concerning the harmonization of the legislations of the EU member states in the services of basic insurances (OJEC L 189, pp. 0013 – 0014, 13 July 1976).

IV – Council Directive 77/92/EEC of 13 December 1976 concerning the working conditions of insurance companies. (OJEC L 026, pp. 0014 – 0019, 31 January 1977).

V – Council Directive 78/473/EEC of 30 May 1978 concerning the group insurances (OJEC L 151, pp. 0025 – 0027, 7 June 1978).

VI – Council Directive 78/473/EEC of 30 May 1978 concerning the reassurance services (OJEC L 151, pp. 0025 – 0027, 7 June 1978).

VII – Council Directive 79/267/EEC of 5 March 1979 concerning life insurances (OJEC L 063, pp. 0001 – 0008 13 March 1979) (has undergone changes for several times).

VIII – Council Directive 84/5/EEC of 30 December 1983 concerning comprehensive insurances (OJEC L 008, pp. 0017 – 0020, 11 January 1984).

IX – Council Directive 87/344/EEC of 22 June 1987 concerning the expenditures of insurance companies (OJEC L 185, pp. 0077 – 0080, 4 July 1987).

X – Council Directive 91/674/EEC of 19 December 1991 concerning the yearly financial accounts of the insurance companies (OJEC L 374, pp. 0007 – 0031, 31 December 1991).

Regulations concerning the Banking Services

I – Council Directive 73/183/EEC of 28 June 1973 concerning the abolishment of restrictions of the activities of the banks and financial enterprises in the EU member states (OJEC L 194, pp. 0001 – 0010, 16 July 1973).

II – Council Directive 77/780/EEC of 12 December 1977 concerning the harmonization of national regulations on credit associations (OJEC L 322, pp. 0030 – 0037, 17 December 1977).

III – Council Directive 86/635/EEC of 8 December 1986 concerning the integration of the annual financial accounts of banks and financial enterprises (OJEC L 372, pp. 0001 – 0017, 31 December 1986).

IV – Council Directive 89/117/EEC of 13 February 1989 concerning the publication of annual accounts of the branches of banks (OJEC L 044, pp. 0040 – 0042, 16 February 1989).

V – Council Directive 89/229/EEC of 17 April 1989 concerning the usage of resources of credit associations (OJEC L 124, pp. 0016 – 0020, 5 May 1989).

VI – Council Directive 91/31/EEC of 19 December 1990 concerning the multinational development banks (OJEC L 017, pp. 00020, 23 January 1991).

VII – Council Directive 92/30/EEC of 6 April 1992 concerning the observation and inspection of credit associations (OJEC L100, pp. 00052 – 0058, 28 April 1992).

VIII – Council Directive 97/5/EEC of 27 January 1997 concerning cross-border credit transfers (OJEC L 043, pp. 00025 – 0031, 14 February 1997).

Regulations concerning the Stock Markets

I – Council Directive 79/729/EEC of 5 March 1979 concerning the security system coordination about the shares in the stock market (OJEC L 066, pp. 00021 – 0032, 16 March 1979) (has undergone changes several times).

II – Council Directive 80/390/EEC of 17 March 1980 concerning the coordination of the shares in the Stock Market (OJEC L 100, pp. 00001 – 0026, 17 April 1980) (has undergone changes several times).

III – Council Directive 82/121/EEC of 15 February 1982 concerning information to be published on a regular basis by companies the shares of which have been admitted to official stock-exchange listings (OJEC L 048, pp. 0026 – 0029, 20 February 1982) (has undergone changes several times).

IV – Council Directive 85/611/EEC of 20 December 1985 concerning the coordination of the administrative and legal legislations on the collective investments (OJEC L 375, pp. 0003 – 0018, 31 December 1985) (has undergone changes several times).

V – Council Directive 93/22/EEC of 10 May 1993 concerning the services of portfolio investments (OJEC L 141, pp. 0027 – 0046, 11 June 1993).

Regulations concerning the Transportation Services

1 – Council Directive 82/470/EEC of 29 June 1982 concerning the services of transportation, travel and product storage (OJEC L 213, pp. 0001 – 0007, 21 July 1982) (has undergone changes for several times).

II – Council bylaw 4057/86 of 22 December 1986 concerning the maritime transportation between the EU member states and between member states and third countries (OJEC L 378, pp. 0014 – 0020, 31 December 1986) (has undergone changes several times).

III – Council Directive 87/540/EEC of 9 November 1987 concerning the mutual recognition of the diplomas of the employees in the maritime transportation sector (OJEC L 322, pp. 0020 – 0024, 12 November 1987) (has undergone changes for several times).

IV – Council Directive 91/670/EEC of 16 December 1991 concerning the mutual recognition of the civil aviation licenses (OJEC L 373, pp. 0021 – 0025, 31 December 1991).

V – Council bylaw 2407/92 of 23 July 1992 concerning licenses of air transportation (OJEC L 240, pp. 0001 – 0007, 24 August 1992) (has undergone changes for several times).

VI – Council bylaw 3577/92 of 7 December 1992 concerning the liberalization of the services in maritime transportation (OJEC L 364, pp. 0007 – 0010, 12 December 1992).

VII – Council Directive 96/50/EEC of 23 July 1996 concerning the condition of obtaining a certificate for the firms transporting in domestic waters (OJEC L 235, pp. 0031 – 0038, 17 August 1996).

VIII – Council Directive 96/26/EEC of 29 April 1996 concerning the mutual recognition of the licenses of national and international passenger transporting operators (OJEC L 124, pp. 0001 – 0010, 23 May 1996).

Regulations on the Area of Movable and Immovable Properties

1 – Council Directive 67/43/EEC of 12 January 1967 concerning the services given by persons who deal with the purchase, selling and the renting of immovable properties (OJEC L 010, pp. 0140 – 0143, 19 January 1967) (has undergone changes for several times).

Regulations Concerning Services in Film and TV Broadcasting

I – Council Directive 63/607/EEC of 15 October 1963 concerning the abolishment of restrictions on the services given in the area of film industry (OJEC 159, pp. 2661 – 2664, 2 November 1963) (has undergone several changes).

II – Council Directive 70/451/EEC of 29 September 1970 concerning the free movement of services produced by self-employed film producers in the film industry (OJEC L 218, pp. 0037 – 0038, 3 October 1970).

III – Council Directive 95/47/EEC of 24 October 1995 concerning the standardization of the television signals (OJEC 281, p. 0051 – 0054, 23 November 1995).

Regulations Concerning Tourism

I – Council Directives 68/368/EEC and 68/369/EEC of 15 October 1968 concerning the abolition of the regulations that restrict the supply of various tourism services (OJEC 260, pp. 19 – 24, 22 October 1968) (has undergone several changes).

Regulations Concerning Health Services

I – Council Directive 75/362/EEC of 16 June 1975 concerning the mutual recognition of the certificates and diplomas of the health service suppliers (OJEC 167, pp. 0001 – 0013, 30 June 1975).

II – Council Directive 77/452/EEC of 27 June 1977 concerning the mutual recognition of the diplomas of nursing services (OJEC 176, pp. 0001 – 0007, 15 June 1977).

III – Council Directive 78/1027/EEC of 18 December 1978 concerning the coordination of regulations on the service supply of surgeon veterinaries (OJEC 362, pp. 0007 – 0009, 23 December 1978).

IV – Council Directive 78/1026/EEC of 18 December 1978 concerning the mutual recognition of the diplomas of veterinaries (OJEC 362, pp. 0001 – 0006, 23 December 1978) (has undergone changes several times).

V – Council Directive 80/115/EEC of 21 January 1980 concerning the mutual recognition of the diplomas of midwifes (OJEC 033, pp. 0008 – 0012, 11 February 1978) (has undergone changes for several times).

VI – Council Directive 85/433/EEC of 16 September 1985 concerning the coordination of the regulations in pharmaceuticals and the mutual recognition of the diplomas in this field (OJEC 253, pp. 0037 – 0042, 24 September 1985).

VII – Council Directive 93/16/EEC of 5 April 1993 concerning the mutual recognition of the diplomas and certificates of doctors in the EU (OJEC 165, pp. 0001 – 0024, 7 July 1993) (has undergone changes for several times).

Regulations Concerning Other Service Sectors

I – Council Directive 77/249/EEC of 22 March 1977 concerning the free service supply of the lawyers in the EU (OJEC 078, pp. 0017 – 0018, 26 March 1977 1978) (has undergone changes several times).

II – Council Directive 85/386/EEC of 10 June 1984 concerning the mutual recognition of the diplomas about the architectural services in the EU (OJEC 223, pp. 000028, 21 August 1985) (has undergone changes several times).

III – Council Directive 98/5/EEC of 16 February 1998 concerning the possibility to work for lawyers in countries other than countries they have received their diplomas (OJEC 077, pp. 0036 – 0043, 14 March 1998).

As it can be seen with all these regulations, the steps that are taken for the liberalisation of trade in services in the EU have a very large scope, and at the same time, are binding. Undoubtedly these regulations have been influential in the development of the free movement of services in the EU. However, despite all these legal and institutional steps, it is still possible to say that the integration and the liberalisation in the services sector are still slower compared to other economic areas.

Especially the differences between EU member states' taxation and social security systems cause several problems in the service supply. Furthermore, there are several problems about the mobility of the labour force. Today, while for an unqualified employer free movement does not constitute any problems; in jobs requiring diplomas the difference between countries still create difficulties (also for personnel who can work on land and sea in the maritime sector). As an example, in some of the EU member states while 6 years is required to complete the medical education, in others this period can be 5 years. As a result, member states can impede persons who have attained the medical education in another country. Although the European Court of Justice generally decides in accordance with further deepening of the free movement of services in relevant cases and generally decides against the member states which restrict the movement, legislative differences in the member states still create problems.

Moreover, the EU member states have also frequently used the articles of the Rome Treaty which gave them the right to restrict the free movement of services in certain conditions. These articles were as follows:

1. Concerning the public services, the member states are immune from the obligations about the free movement of services[4].
2. Council, with the proposal of the Commission can exclude some of the activities from free movement of services with qualified majority[5]
3. The national bylaws and regulations formed for the public order, public security and public health services in the member states, are immune from obligations of the free movement of services[6].

By making use of these articles, the EU member states restricted the free movement of services, especially until the finalisation of the Customs Union. However, due to the increasing importance of trade in services for economic integration in the Union, these kinds of restrictions have been rarely used during the last couple of years.

4. GENERAL CONCLUSIONS

Today, the general trade between the EU member states is not at the desired levels. Furthermore, the service suppliers of the EU member states can sell only 10 % of their services in other EU member states. This shows that besides the institutional and legal deficiencies, there are also social, cultural and economic obstacles that prevent the further liberalisation of the trade in services. To this end, the results of a survey conducted by the European Commission are interesting and informative.

Table 5

Obstacles in the Service Supply in Other EU Member States According to the Service Suppliers

OBSTACLES (Respondents gave more than one answer.)	%
1. Difficulties arising as a result of the necessity to use the domestic language in the service supply.	44.3
2. Distance.	36.6
3. Obligation to stay in the country after providing of the services.	34.5
4. Application of the national standards and certificate requirements to the foreign service suppliers.	31.9
5. Various requested documents from the service suppliers.	30.9
6. Complexity of the legal systems of the member states.	30.9
7. Domestic performance reports requested from the service suppliers.	29.3
8. Differences in the domestic business applications.	28.6
9. Necessity to be represented by a local branch.	27.4
10. Lack of the transparency and openness in the local rules.	27.4
11. High costs of opening of a branch in the member states.	25.7

As it can be seen from these results, the problems of further developing the free movement of services in the EU are not solely related with the deficiencies in institutional and legal steps at the national and the supranational levels. In fact, the social and cultural differences between the member states also negatively effect the free movements of services. The full liberalisation of service markets can be possible with the widening of the branches of services and relevant enterprises. Service suppliers, who perceive the EU as a real single market and develop relevant strategies, will be crucial in this regard.

The EU institutions have created quite a lot of regulations to encourage the free movement of services. Especially, in the special Summit meeting held in Lisbon on 23 – 24 March 2000 various decisions concerning the EU economy have been taken. In this Summit, the Council has put forth its new goals aiming at reinforcing the employment in the context of a knowledge based economy, the economic reform and the social harmonization. New strategic goal of the Union for ten years has been described as to create a dynamic economy, achieving sustainable economic growth, having a high competitive power with more and better job opportunities and social harmony. In order to attain these it has been decided to implement a general strategy containing the goals below[7]:

- The improvement of various policies for research and development, the acceleration of structural reforms for competitiveness and revision of the single market for the transition towards a knowledge based economy.
- The renewal of the European social model, investment in individuals and the continuation of the struggle against social exclusion.
- The implementation of suitable macro-economic policies for a healthy economy and sustainable growth.

In this context, the European Commission has been appointed to prepare a specific program in order to advance the free movement of services. This program has been prepared by the Commission on 29 December 2000[8] and aims the removal of all obstacles against the free movement of services in the Union. In this context, EU Commission organized surveys concerning the relevant sectors to determine the obstacles in front of the free movement of services. The Commission, by working with the member states, has also started to give more support to the new regulations concerning the free movement of services. Recent examples to these kinds of laws are; the liberalization of postal services and the harmonization of added value taxes.

In the framework of the above mentioned program, the EU Commission, following the preparation of detailed lists concerning the actual obstacles, has demanded schedules from the member states to abolish the existing restrictions. With theses steps, the removal of the obstacles in free movement of services partly achieved in 2005. However, there still exist various problems as the member states are reluctant to fully open their service sectors to other member states' service suppliers. Additionally, the cultural, social and business practice differences keep the liberalization of services as a difficult task. Although the EU citizens have the right to move freely within the Union, the number of people who actually reside in a member state other than his/her own to work is still too small. Language differences also make the situation worse. As a result, one can still say that the providing of services in other member states remains as a future goal.

---

[1] Trebilcock, Micheal and Howse, Roberts (Eds), *The Regulation of International Trade*, London: Routledge Press, 1995, p. 17.
[2] Official Journal of the European Communities, 15 January 1962, No: 002.
[3] Günuğur, Haluk, 'Free Movement of Services in the European Union and Turkey-EU Relations', Asomedya: Journal of Ankara Chamber of Industry, October 1999.
[4] Article 55/1 of the Rome Treaty.
[5] Article 55/2 of the Rome Treaty.
[6] Article 56/2 of the Rome Treaty.
[7] The Bulletin of the Economic Development Found, 15 – 31 March 2000.
[8] COM (2000) 888 Final.

EVALUATION OF SERVICE LEVEL OF MAJOR TURKISH CONTAINER PORTS

Yavuz Keceli,
Assistant Professor
Gizem Gunay,
Research Assistant
Serdar Kum,
Research Assistant
Istanbul Technical University, Maritime Faculty
E-mail: Keceli@itu.edu.tr

Abstract. Due to the severe changes in the international port industry, the ports around the world are in a severe competition to become the "hub" port of their region. For this purpose, they are not only heavily investing in their infrastructure, but also implementing modern management techniques to survive in this fierce competition. Hence, this paper tried to evaluate the service level of major Turkish ports. A questionnaire survey was conducted targeting field experts which are the decision makers of shipping companies in Turkey. Seven factors for service quality of ports were derived from literature. The relative weights of these factors were determined by Analytic Hierarchy Process (AHP) and construct validity of each factor was checked by confirmatory factor analysis. On the basis of the results, several suggestions were derived for Turkish port industry.

1. INTRODUCTION

In the last few decades, international logistics environment has experienced considerable change. Various factors, such as increasing amount of international trade, advent of ultra-large container vessels, changing demands of the shippers, advancements in container handling technology and information systems, formed a hub-and-spoke system, in which cargo is transported by ultra-large vessels to some advanced hub ports and transshipped to smaller ports by feeder vessels. Such a business environment forced the ports to compete severely by investing in infrastructure, deploying high-technology and improving their customer services to assure their position as the hub port of their region.

On the other hand, Turkish seaports fell back in this competition, thus bureaucratic inefficiencies and lack of appropriate infrastructure caused the logistics route between Asia and Europe drift beyond the borders of Turkey. Thus this research aims to evaluate the service level of Turkish ports and to derive contributions for future developments.

2. LITERATURE SURVEY

2.1. Turkish Ports

In the study of Keceli et al. [1] the level of information systems in Turkish public ports were reviewed and direction of improvement was suggested. It is stated that these ports suffer from severe administrational and structural problems. The administrational problems include severe bureaucratic and regulative inefficiency, expensive port services, low speed of port and customs services, inefficient flow of information and coordination between port-related parties, insufficient human resources, insufficient advertising and marketing of the ports, unregistered port land, and insurance policy that does not cover damages given to ships and cargo. Structural problems of include insufficient physical resources of the ports are insufficient, such as quays and wharves, lengths and drafts, equipments and vehicles, insufficient infrastructure for intermodal transport, lack of easy access cargo tracking system and container land terminals, old equipment and frequent congestions. The study also offers a direction of improvement for information systems to overcome these problems. The research of Keceli et al. [2] studies the information systems of Kumport, which is a private container port in Istanbul. Kumport was awarded as the most efficient port in Turkey in 2006, and the success of the port is mainly due to its information systems. The research focuses on three main points. First, the system should be in consistency with legal requirements of Turkey. Second, the success of Kumport depends on vision, foresight, resoluteness and enforcement of the top management. And finally, lack of consciousness of laborers and customers about information systems may cause resistance, which must be overcome by the port management.

The study of Yilmaz and Cerit [3] explores strategies to increase the potential of Turkish domestic cargo shipping, by interviewing the field experts using Delphi method. The results are categorized under four main conceptual categories; promotion, cooperation, ports, shipping service characteristics. The paper emphasizes the importance of the ports for improving domestic shipping, and points out the necessity of quantitative research on this subject.

The research of Tuna [4] examines the developments of hub ports in Turkey and their impact on national logistics strategy. Turkey's international trade, relations with European Union and regional developments were considered as major determinants of port development and the Turkish ports were analyzed for potential to be a hub port, mainly based on port location and hinterland connections. The research concludes that Turkish ports have a great potential to be hub ports, but the success depends on various other factors, such as economic and political stability, adequate infrastructure, cheaper costs, simplified customs procedures, adequate information infrastructure and a wide range of port services.

Yeni and Tuna [5] conducted a review on logistics oriented developments in Turkish container ports. According to the paper, although Turkey has a strategic position in terms of logistics and shipping, Turkish ports are in the initial stage of offering logistics value added services.

Yurt et al. [6] analyzed the major developments of Izmir Port by considering regional developments in the maritime related logistics services. UNCTAD Model of Port Development was applied to Izmir Port. As a result, the paper concludes that general characteristics of the Port of Izmir illustrate that it is a modern type of a port while adopting the up-to-date activities and services although the port's problems related to infrastructure, human resources, management and port services affect Turkish economy negatively.

All of the studies related above agree on the fact that Turkish ports are very advantageous according to their location and regional developments of the hinterland, but the ports cannot make use of such advantages due to several structural and managerial problems.

2.2. Service Level

The factors required for evaluation of service quality of ports are deducted from similar previous research. For example, the study of Ha [7] has compared and evaluated the service quality factors of major container ports from the viewpoints of ship operators and logistics managers. The factors of importance are separated into 7 groups. The questionnaires focusing on these factors are processed using validity, ANOVA and Duncan test analysis. This study indicates that Busan and Kwangyang if they are to improve their competitive position in the container trades of northeast Asia need to upgrade the service quality in various service categories.

Other group of studies are on the port selection of shipping companies or freight forwarders. The study of Tongzon [8] has sought to determine the key factors in port choice and to assess their relative importance, using a survey method applied to a sample of shippers and basic econometrics. The study of Cuadrado et al. [9] aims to adapt the benchmarking technique to the sphere of ports by comparing the activity of a port with that of its competitors. Tennet [10] conducted a questionnaire survey targeting carriers and freight forwarders in order to seize their perceptions for port selection.

The third group consists of papers that try to determine the service quality of ports within the restricted context, such as Pedersen and Gray [11] trying to find out the transport selection of Norwegian exporters, or Ugboma et al. [12] measuring the service quality of Nigerian ports.

3. METHODOLOGY

On the basis of the previous studies, the following factors were derived to measure the service quality of Turkish ports.

Table 1

Derived Factors

	Factors						
Source	**Port's Location**	**Port's Infrastructure**	**Port's Information Services**	**Port's Cost**	**Port's Efficiency**	**Port's Human Resouces**	**Port's Custumer Services**
Ha (2003)	X	X	X	X	X	X	X
Tennet (2004)	X	X	X	X	X		X
Tongzon (1998)	X	X	X	X	X		X
Ugboma et al. (2004)		X			X	X	X
Pedersen and Gray (1998)				X	X		X
Cuadrada et al. (2004)	X						X

And the construct variables were also deducted out of the previous studies, as shown in Table 2.

Table 2

Construct Variables

Factor	Construct Variable	Source
Port's location	L1-main trunk road	Ha(2003), Tennet(2004), Tongzon(1998), Cuadrada(2004)
	L2-close to industrial areas	
	L3-efficient for transshipment	
Port's infrastructure	I1- vessel traffic system	Ha(2003), Tennet(2004), Tongzon(1998), Ugboma(2004)
	I2- approach channel	
	I3-intermodal(connections with hinterland)	
	I4- availability of yard	
	I5- availability of equipment	
Port's information services	IN1-EDI	Ha(2003), Tennet(2004), Tongzon(1998)
	IN2-web based information offering	
	IN3-cargo tracking	
Port's cost	C1-port charges	Ha(2003), Tennet(2004), Pedersen(1998), Tongzon(1998)
	C2-service charges (pilotage, towage etc)	
Port's efficiency	E1- speed of operations	Ha(2003), Tongzon(1998), Pedersen(1998), Tennet(2004), Ugboma(2004)
	E2- delivery on time	
	E3- damage performance	
Port's human resources	H1- management skills	Ha(2003), Ugboma(2004)
	H2- laborer's knowledge and skills	
Port's customer services	CU1- ease of handling(paperwork, ready procedures etc)	Ha(2003), Tongzon(1998), Pedersen(1998), Tennet(2004), Ugboma(2004),Cuadrada(2004)
	CU2- offer value added services	
	CU3- fast response to claims and problems	
	CU4- free dwell time for cargo	

The derived factors were used to compose a questionnaire to collect the perceptions of 23 carefully-selected field experts, i.e. decision makers of local shipping companies in Turkey. The questionnaire consists of two part, the first one asks the relative importance of the factors, and the second one asks the opinion of the respondents about the seven ports that handled over 100 000 TEU's in 2007 for each particular question.

4. RESULTS

The responses of the 23 carefully-selected field experts were analyzed via series of methods. The first part of the questionnaire was consists of questions that the respondents compares assess several pieces systematically by comparing them one another two at a time. This part was analyzed by using Analytic Hierarchy Process (AHP) technique. AHP is a multi-criteria decision making process which provides a method of measurement with ratio scales (Saaty, [13]). During the comparison process assessors can concern the solid data about the pieces or they can take their impressions about relative meaning and importance of the pieces into consideration. This is the very nature of AHP that human impressions are subject to use for performing assessment [14]. Preliminary results are given in Table 3.

Table 3

AHP Analysis Results

	Port's Location	Port's Infrastructure	Port's Information Services	Port's Cost	Port's Efficiency	Port's Human Resouces	Port's Custumer Services	Incon.
Expert 1	0,027	0,056	0,070	0,489	0,103	0,126	0,129	0,420
Expert 2	0,165	0,073	0,037	0,219	0,116	0,195	0,195	0,250
Expert 3	0,068	0,073	0,058	0,194	0,137	0,319	0,150	0,620
Expert 4	0,247	0,180	0,126	0,285	0,112	0,024	0,028	0,540
Expert 5	0,365	0,197	0,088	0,245	0,059	0,019	0,027	0,390
Expert 6	0,337	0,206	0,090	0,250	0,064	0,018	0,036	0,310
Expert 7	0,256	0,211	0,045	0,274	0,116	0,032	0,066	0,170
Expert 8	0,419	0,180	0,040	0,147	0,137	0,021	0,056	0,130
Expert 9	0,439	0,112	0,029	0,217	0,117	0,018	0,068	0,140
Expert 10	0,334	0,266	0,044	0,181	0,119	0,016	0,040	0,170
Expert 11	0,379	0,140	0,059	0,237	0,144	0,020	0,021	0,160
Expert 12	0,237	0,395	0,055	0,146	0,127	0,019	0,020	0,170
Expert 13	0,395	0,115	0,044	0,279	0,113	0,016	0,037	0,200
Expert 14	0,272	0,258	0,049	0,254	0,108	0,026	0,033	0,080
Expert 15	0,144	0,117	0,033	0,206	0,351	0,082	0,067	0,050
Expert 16	0,153	0,045	0,112	0,241	0,166	0,099	0,183	0,070
Expert 17	0,282	0,176	0,173	0,248	0,075	0,013	0,033	0,420
Expert 18	0,205	0,278	0,057	0,271	0,118	0,027	0,043	0,120
Expert 19	0,209	0,257	0,121	0,193	0,072	0,071	0,077	0,600
Expert 20	0,354	0,277	0,030	0,179	0,106	0,016	0,038	0,150
Expert 21	0,335	0,230	0,049	0,239	0,096	0,017	0,034	0,160
Expert 22	0,213	0,231	0,019	0,362	0,118	0,018	0,038	0,200
Expert 23	0,204	0,400	0,033	0,218	0,096	0,023	0,025	0,150
AVR	0,263	0,194	0,064	0,242	0,120	0,054	0,063	0,247
STD	0,110	0,097	0,038	0,072	0,056	0,073	0,051	0,169

In the second part of the questionnaire, the respondents were asked to asses each aspect of seven ports on a 9-point Lickert scale, agree-disagree type of questions. Since every factor is to be measured via several construct variables, the internal validity of the constructs were checked via confirmatory factor analysis. On the basis of the preliminary results, two of the factors, i.e. I3 and E3, were omitted from the solution. The results of the factor analysis are given in Table 4.

Table 4

Factor Analysis Results

		KMO and Bartlett's Test		Communalities	Total Variance Explained	Component Matrix
		Sampling Adequacy	Significance (<0,01)	Extraction	% of Variance	Component
L	L1	0,5677	0,0000	0,4129	49,8332	0,6426
	L2			0,6245	28,6904	0,7903
	L3			0,4576	21,4764	0,6764
I	I1	0,7206	0,0000	0,6798	55,2803	0,8245
	I2			0,5625	18,0533	0,7500
	I4			0,4312	16,1659	0,6567
	I5			0,5378	10,5005	0,7334
IN	IN1	0,6774	0,0000	0,7050	67,3545	0,8397
	IN2			0,5937	19,2104	0,7705
	IN3			0,7219	13,4350	0,8496
C	C1	0,5000	0,0002	0,644895	64,489529	0,803054
	C2			0,644895	35,510471	0,803054
E	E1	0,5	0,0000	0,844467	84,446652	0,918949
	E2			0,844467	15,553348	0,918949
H	H1	0,5	0,0000	0,759759	75,975943	0,871642
	H2			0,759759	24,024057	0,871642
CU	CU1	0,610292	0,0000	0,614111	46,481946	0,783652
	CU2			0,376091	24,062621	0,613263
	CU3			0,65319	18,040325	0,808202
	CU4			0,215886	11,415107	0,464635

On the basis of the results; average values of each port for each factor is given in Fig. 1, whereas Fig. 2 shows average values of each factor for each port. Finally, overall scores of each port is given in Fig. 3.

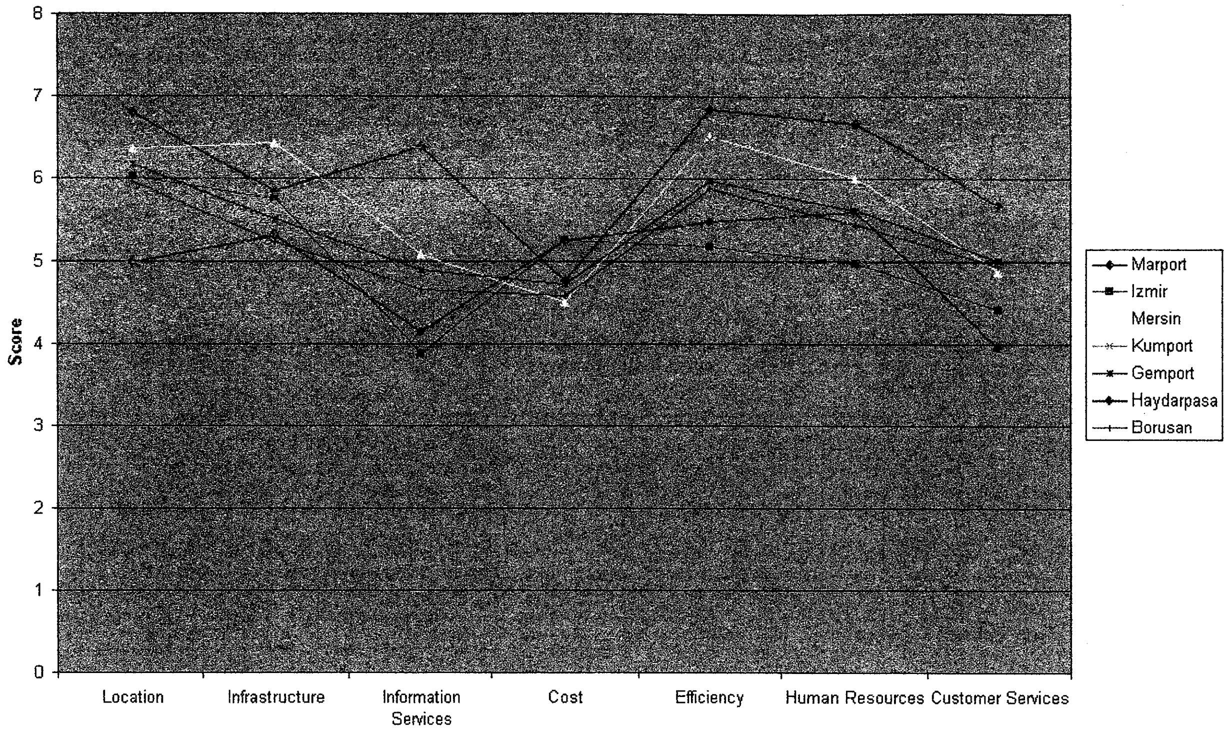


Fig. 1. Average Values of Each Port for Each Factor

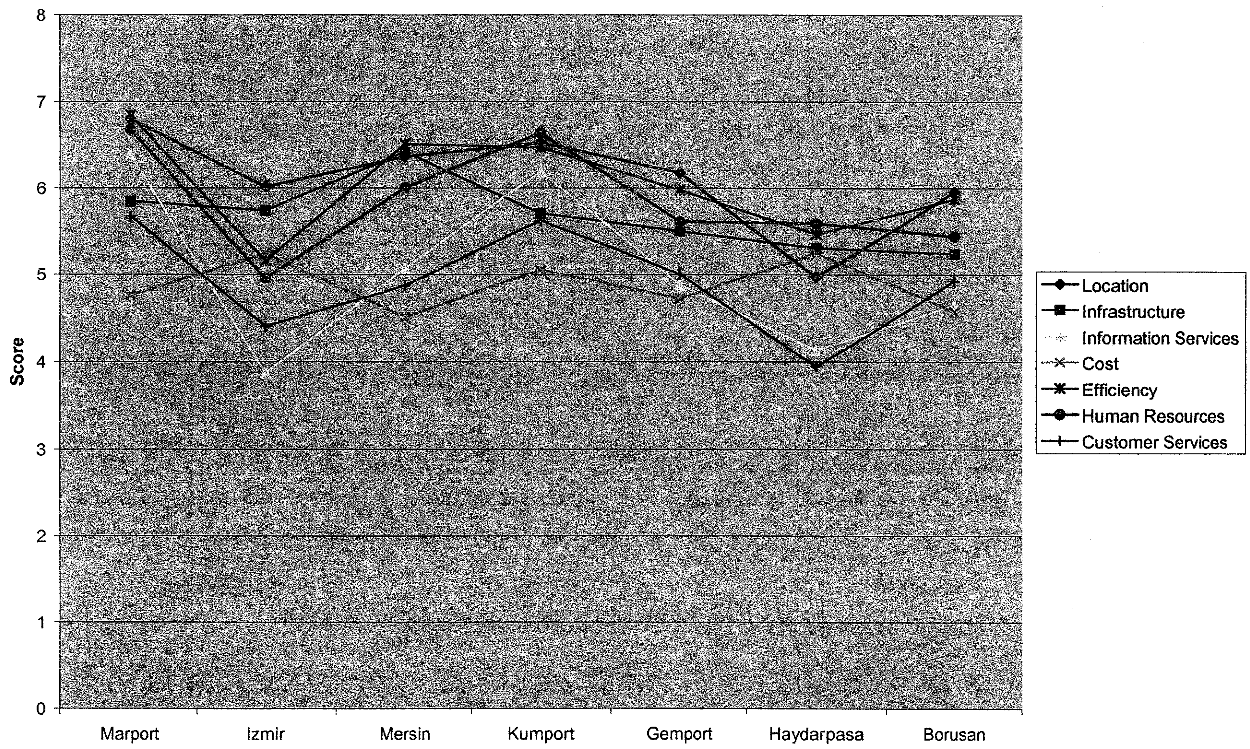


Fig. 2. Average Values of Each Factor for Each Port

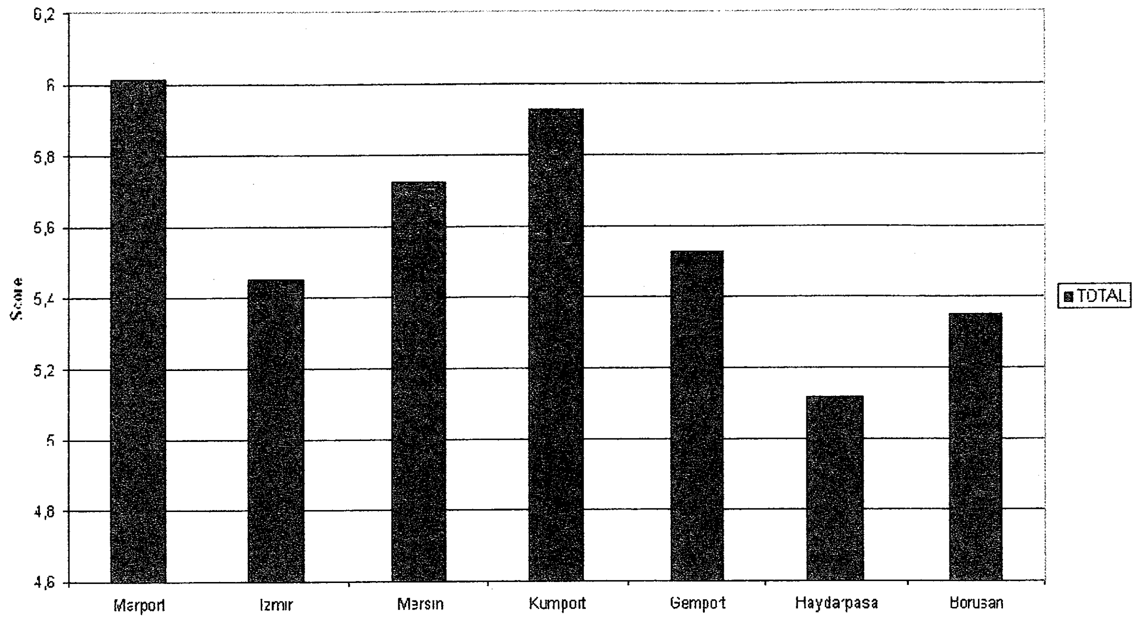


Fig. 3. Overall Scores of Each Port

5. DISCUSSION

Locations of Marport and Kumport are in close proximity to each other. Beside that they have appropriate connection points for distribution to Europe Continent. Marport has the highest result in Location Factor and Kumport follows Marport. TCDD Haydarpasa Port is the worst for this factor. It might be a result of that TCDD Hapdarpasa Port is in the center of Istanbul and the port needs solution at the point of connection with traffic. Thus, The Turkish Government plans to transport the port to another location.

Mersin International Port is the widest Turkish Port. In related with this ingredient, MIP has the highest value according to our survey results in Infrastructure Factor. TCDD Haydarpasa Ports has the worst result in this factor. The reason of this may be limited maneuvering space of TCDD Haydarpasa Port.

The qualities of Information Services provide to complete feedback cycle more quickly. Kumport and Marport are on the top of the scale in Information Service Factor. These two ports have obvious difference between the other ports in this factor. TCDD Izmir Port is the worst and TCDD Haydarpasa Port is on the second bench after TCDD Izmir Port which is operated by the Turkish Government with TCDD Haydarpasa Port (Keceli et al., [1]).

Marport and Kumport are at the same point for Cost Factor. As shown on the Graph -1, compared with other factors, in these factor Marport and Kumport have less satisfactory results. The other five ports have close results. However, they have more satisfactory values compared with other factors.

Efficiency, Human Resources and Customer Services Factors have parallel results. In these factors the main results is that the ports which are operated by Turkish government have lower ranks than the other ports (Keceli et al., [1]).

6. CONCLUSION

The ports that we examine in this paper could be collected in three groups which are arrayed by ports survey results in our study. First group contains Marport and Kumport, second one contains Mersin International Port, Gemport and Borusan and the last one contains TCDD Haydarpasa and TCDD Izmir Ports which are operated by the Turkish Government.

Mersin International Port was operated by Turkish Government until May 2007. The port was leased to Port of Singapore Authority within the scope of privatization in 2007. In a comparative aspect, development of MIP can not be denied against to the TCDD Haydarpasa and TCDD Izmir Ports which are still operated by Turkish Government. One of our contributions, signalize how privatization affects recent status Of the Turkish Ports. Thus, The TCDD Haydarpasa and The TCDD Izmir Ports could be formed an opinion about how privatization eliminates their lacks and assist to develop their ports service level.

On the other hand, this study reveals lacks of the ports in which service point, assists to develop their service productivity and it also assists for their further research.

References

[1] Keceli, Y. and Choi, H.R., Level of Information Systems in Turkish Public Ports and Direction of Improvement', Int. J. Logistics Systems and Management, Vol. 4, No. 6, 2008, pp. 673 – 691.

[2] Keceli,Y. ,Choi, H. R., Park, N. K., Analysis of Success Factors of Information Systems Development in Kumport and Implications for Other Turkish Ports, WSEAS Transactions on Information Science and Applications, Vol. 4, Issue 5, 2007, pp. 1014 – 1047.

[3] Yilmaz, A.B., Cerit, A.G., Exploring Strategies to Increase the Potential of Turkish Domestic Cargo Shipping, Proceedings of IAME 2005 Conference, Cyprus, 2005.

[4] Tuna, O., The Impact of Hub Ports on the Logistics Strategies of Turkey, Proceedings of Gwangyang Port Forum, Gwangyang, South Korea, 2002.

[5] Yeni, K., Tuna, O., Logistics Oriented Developments in Container Ports: A Review on Turkish Ports, Proceedings of IAME 2003 Conference, Busan, South Korea, 2003.

[6] Yurt, O., Yumurtaci, I.A., Yercan, F., Maritime Related Logistics Services and Developments in the Port Industry: Port of Izmir Case, Proceedings of 4th International Logistics and Supply Chain Conference, Izmir, Turkey, 2006.

[7] Ha, M.S., A comparison of service quality at major container ports: implications for Korean ports, Journal of Transport Geography, Vol. 11, 2003, pp. 131 – 137.

[8] Tongzon, J., Port Choice Determinants in a Competitive Environment, Proceedings of IAME 2002 Conference, Panama, 2002.

[9] Cuadrado, M., Frasquet, M., Cervera, A., Benchmarking the port services: a customer oriented proposal, Benchmarking: An International Journal, Vol. 11, No. 3, 2004, pp. 320 – 330

[10] Tennet, A., Port Choice Determinants and Port Selection Process based on the Perceptions of Carriers and Freight Forwarders, Master thesis, Pukyong National University, Busan, South Korea, 2004.

[11] Pedersen, E.L., Gray, R., The transport selection criteria of Norwegian exporters, International Journal of Physical Distribution & Logistics Management, Vol. 28 No. 2, 1998, 1998, pp. 108 – 120.

[12] Ugboma, C., Ibe, C., Ogwude, I. C., Service quality measurement in ports of a developing economy, Managing Service Quality, Vol. 14, No. 6, 2004, pp. 487 – 495.

[13] Saaty TL. The analytic hierarchy process: what it is and how it is used, Mathematical Modelling, Vol. 9, 1987, pp. 161 – 76.

[14] Wikipedia, http://en.wikipedia.org/wiki/Analytic_Hierarchy_Process, accessed on: 25.05.2009.

A STUDY ON PORT COMMUNITY SYSTEM DEVELOPMENT STRATEGIES IN TURKEY

Yavuz Keceli,
Assistant Professor
Maritime Faculty, Istanbul Technical University
E-mail: Keceli@itu.edu.tr

Abstract. The efficiency of communications among all the organizations which are somewhat connected to a seaport is crucial for effective port administration. The absence of such communication in Turkish maritime industry causes severe problems. Thus this paper aims to develop a guideline for successful development of a port community system in Turkey on the basis of SWOT analysis of the current situation and benchmarking successful cases around the world. For this purpose in-depth interviews were carried out with field experts of both public and industrial organizations. As a result, a three-stage development strategy was proposed.

1. INTRODUCTION

The appearance of international port logistics industry has been changing rapidly in the last few decades. In the old days, seaport were generally local institutions only serving their own hinterland. On the other hand increasing amount of international trade and container throughput, advent of ultra-large container vessels, changing customer demands, developments in information technology and new handling equipments, concerns about security and environmental issues have been putting great pressure on port administrations to increase their operational productivity and compete with other ports on a global scale. The advanced ports around the world are in a severe competition to ensure their strategic position as "hub" ports. In order to confront this competitive pressure, ports are investing heavily in their infrastructure and improving their operation systems.

Among these investments and improvement efforts, port community systems, which are "computer networks which link up the port with all the companies that use it, including hauliers, rail companies, shipping lines, feeder ports, shippers and customs officers" (Forward, 2003) are least studied. Such networks are being implemented in order to reduce paperwork and facilitate the information flow related for port operations and customs declarations, thus can significantly contribute to competitive power of a seaport.

Absence of such a system causes severe problems in Turkish maritime industry. Except for Customs Office and some terminal operators, most of the communications are carried out on paper. Even though customs and some terminal operators offer online declaration services, these services are not interconnected, thus the information stays where it is declared and cannot flow along the supply chain. For these reasons Turkish government, especially The Undersecretariat for Maritime Affairs, has been trying to establish a central information system to facilitate information flow along the whole seaport community.

On the other hand port community systems (PCS) require the participation of various organizations with different characteristics, often challenge them to integrate their systems or change their business processes. Previous studies state severe resistance of the port users which causes failure of the projects (Keceli et al., 2007) or delays and additional costs (Jeffrey, 1999). Considering the high failure rate of previous PCS development attempts, this paper aims to propose a model for successful PCS development in Turkey. For this purpose, the current situation of port operations and information flow among the port community was analyzed through in-depth interviews with public and industrial experts. Then a three-stage-transformation-strategy was proposed on the basis of SWOT analysis of the current situation and benchmarking succesful cases around the world.

2. THEORETICAL BACKGROUND

2.1. Information Systems Used in Port Operations

The information systems used in port operations have three major functionalities (Fig. 1). Terminal operating systems (TOS) are "computer systems available for organizing the container terminal itself" (Jeffrey, [1]). These systems generally provide features related to the physical handling of cargo within the terminal area, such as planning, operation control, job instructions for equipments, etc. On the other hand Port Management Information Systems (PMIS) generally provide the upper management with features to monitor and control the overall port activities and other managerial functions, such as billing, automatic reporting, etc. Moreover, Port Community Systems are "computer networks which link up the port with all the companies that use it, including hauliers, rail companies, shipping lines, feeder ports, shippers and customs officers" (Forward, [2]). Such systems can be distinct systems or different modules in one integrated system, depending on the organizational structure of the port.

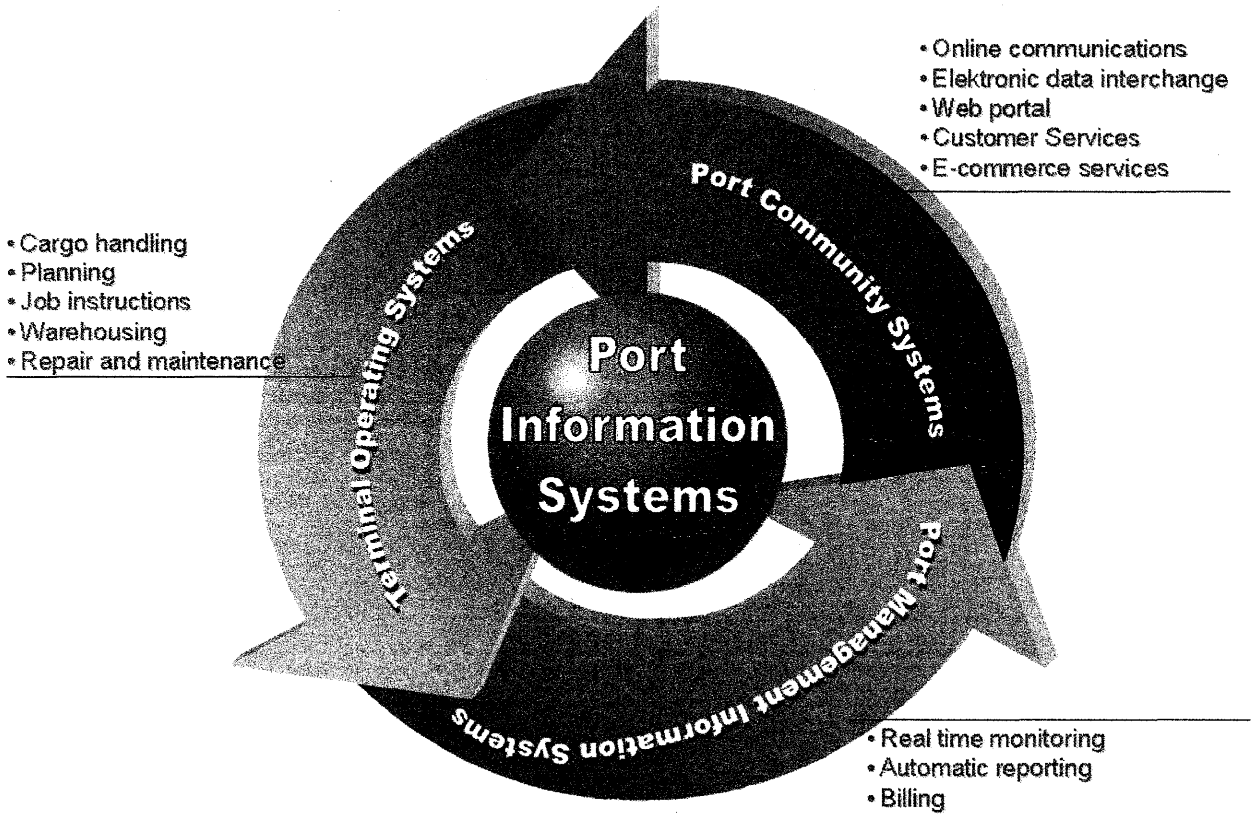


Fig. 1. Information Systems Used in Port Operations

2.2. Port Community Systems in World's Advanced Ports

Port community systems have various forms and characteristics in each and every port. Among them, Portnet in Port of Singapore is the one that is most studied in previous research. Port of Singapore Authority's (PSA) Portnet is the representative port community system since it is totally connected to PSA's terminal operating system (CITOS) and custom declaration system (TradeXchange) of Singapore government (Applegate [3]). Besides Portnet, Data Communications System (Dakosy) [4] and COAST [5] (Container Authorization System) of Port of Hamburg, Customer Plus Programme and OnePort Ltd.[6] and Tradelink [7] of Port of Hong Kong, PortofRotterdam.com [8], Virtual Port and WebJonas [2] of Port of Rotterdam, PORT-MIS [9] and KTNET [10] in Busan Port can be considered as some of the well-known port community systems around the world. When the functionalities and services of these systems are examined, it can be easily concluded that not all of these systems offer full services required by the port community, but some of them only offer a portion of the services, depending on the major stakeholders of each system. These functions can be classified under three major categories, namely port management related tasks, customs related tasks, and online platforms for electronic commerce among the port users, as shown in Table 1.

Table 1

Port Community Systems in World's Advanced Ports

Port	System	Operator	Function		
			Port Related Document Submission	**Customs Related Document Submission**	**e-Business Function Among Port Users**
Singapore	Portnet	Portnet.com	✓	✓	✓
	TradeXchange	CrimsonLogic Ltd.	x	✓	✓
Hamburg	Dakosy	Dakosy AG	✓	✓	✓
	COAST	HHLA	✓	x	x
Hong Kong	OnePort	OnePort Limited	✓	x	x
	Tradelink	Tradelink Electronic Commerce Limited	x	✓	✓
Rotterdam	Port Infolink	Port Infolink B.V.	✓	✓	x
	Portofrotterdam.com	The Port of Rotterdam Authority	✓	x	✓
	WebJonas		x	x	✓
Busan	Port-MIS	KL-Net	✓	x	x
	KTNET	KTNET	x	✓	x

2.3. Previous Studies on Port Community Systems

Traditionally, port users deliver cargo related documents and forms for port service requests through paper-based methods, such as sending a fax or handing in the documents directly. Sending the documents via e-mail also became a common practice due to the diffusion of the internet. The delivered information must be typed again in the port's information systems. Such typing works consume time and are vulnerable to typing errors. Port community systems allow the users to make service requests and input their information directly into the port's information system. Such a system drastically decreases paperwork, improves data quality, enables data integrity among different stakeholders, and supports the port management for operations ([11], [12]).

The study of Keceli et al. [13] is a case on Kumport's information systems. This paper is the first one to indicate resistance of port customers to information services offered by the port. It was stated the information services were not accepted by most of the customers, except for some big agencies that also work with foreign ports. Since the customers who appreciate the system are the ones who have already tried similar procedures in other foreign ports, the main reason for this refusal is that these local agencies don't have experience about the information systems, thus cannot realize the convenience and benefits that the system will bring to their businesses. Thus, Keceli et al. [14] studied on the factors affecting adoption of PCS by sea and land carriers in Busan Port. The paper concludes that factors related to adopter company han the most powerful impact on system adoption, thus a successful implementation of a PCS definitely requires intimate relations with potential users

The study of Rodon and Ramis-Pujol [15] is a case study on Spanish Port Community Systems and it focuses on integrating with an existing system. It states that companies do not want changes to their activities and data models. Since it did not fit with adopters' processes, firms refused the programs. The study of Rodon et al. [16] is another case study on port community of Port of Barcelona, and it focuses on stake-holder relations in B2B environment. According to the paper, the potential users could not identify such practices in their daily operations, thus an increase in the interest for standard adoption among those who have participated in the standardization.

The article of Vincent [11] explains the PCS development efforts in India. The port community in India lacks a suitable EDI service provider, which was raised as one of the major obstacles in implementing EDI. The article states that one of the major obstacles to implementing a port community system in India is the cost of setting up and running such a system.

There are a few studies on port community systems; most of them are descriptive in nature (Rodon and Ramis-Pujol, [15]), mostly case studies.The deductions of these cases are utilized in the development of a suitable PCS implementation strategy for Turkish port industry.

3. CURRENT PORT ADMINISTRATION SYSTEM IN TURKEY

In order to analyze the current situation of port administration system in Turkey, several in-depth interviews were performed with field experts from Undersecretariat for Maritime Affairs, Harbour Master and some private ports.

Due to lack of a system for online data exchange, most of the operations are carried on paper-based methods. Some of the organizations have deployed or developed their own information systems, but transfer of data between such systems is not possible, since these systems are not developed without considering compatibility with each other, thus not integrated.

It is shipping agents duty to transfer each document from one organization to another, mostly as a printed document, as given in Fig. 2. Before the ship arrives at the port, the agent submits the required documents (1) to customs office to obtain permission to berth (2). The submits similar documents to the harbor master including the permission of the customs (3) in order to obtain permission to berth (4). The permissions are submitted altogether to the port administration (5) so that the ship can actually berth(6). After the berthing, customs officers board on the ship –generally with police officers– in order to inspect cargo and documentation. After inspections, customs officers issue a permission of loading(7), before which port operations cannot start. After the permission of the customs, port operations starts when the ship captain hands over the loading plan (8) to the port personelle. The port personnel generally record the berth and yard operations on a clipboard, and then input these information to the computers in the office (9). Some ports use sophisticated TOS software to control terminal operations, but such systems are not integrated to any external network for information exchange.

Both harbour master and customs office require the port management to submit status information via internet. Port officers are required to submit ship information, i.e. name, ship characteristics, positions and status, to the harbour master via internet on a daily basis (10). If the port handles liquid cargo, port officers are required to submit the cargo status in each tank to the customs office via internet on an hourly basis (11). No such requirement exists for other types of cargo.

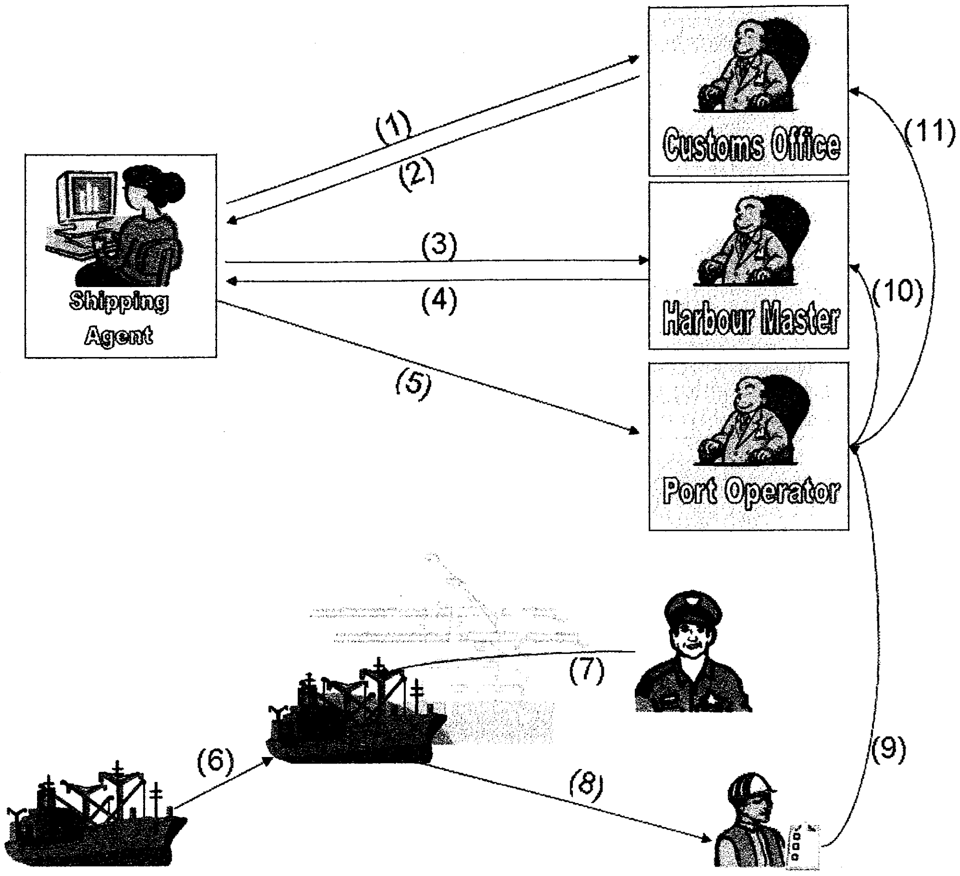


Fig. 2. Summary of Current Situation

4. PROBLEMS OF THE CURRENT SYSTEM

The general situation of the current system can be summarized as follows;

- **Too many repeated actions:** The shipping agents deliver the same documents to various institutions which decreases efficiency and increases process time. Since the same data on same documents are processed manually and differently in each institution, which is sussaptable to every kind of human related errors (i.e. typing errors), eventually causing inconsistencies.
- **Intense paper traffic:** Since logistic activities are connected to eachother just like the rings of a chain, the output data of one institution becomes the input for the another one. Eventhough each organization may have its own information processing capability, inter-organizational information transfer is based on paper. Data is printed out in one office, transported by the shipping agent, and then manually inputted in the other due to lack of connecting network among the organizations. Such paper dependance not only decreases overall efficiency, but also increases time of operations and rate of error.
- **Unreliable statistical data:** The data related to port activities are submitted by the port management to the harbour masters' office. But the port managements submit different figures to different organizations and there is no way to confirm which one really represents the actual situation of the ports. Ports may declare more than the actual their throughput to their customers in order to gain competitive advantage in the market, and they may declare less than the actual throughput to governmental offices in order to pay less tax. Any kind of additional statistical

data, such as performance indicators, speed of handling etc., can only be obtained by demand. Thus, there are serious problems about the quality and consistency of the statistical data for planning future projects and investments.

- **Weak control:** Paper-based operations have no back-up capability when processing officer makes a mistake. An officer may issue and permission to leave the port to a ship which is already detained by police, surveyor or another organization. Thisproblem becomes more serious if the harbor master's office lack qualified human resources.
- **Difficulties in reaching information:** Storing information on paper makes it impossible to be accessed online. Thus any government, private or academic party has to make a request for any kind of information needed for any kind of research, project or investment. Eventhough if these requests are welcomed by the relevant authorities, it takes a long time to arrange and submit such information since hard-copy data is not convenient for analysis.

5. SWOT ANALYSIS OF THE CURRENT SYSTEM

In order to propose a direction of improvement, we have conducted a Strength-Weakness-Opportunity-Threat (SWOT) analysis.

Table 2

SWOT Analysis

Strength – Proven technology - successful and unsuccessful cases are abundant for benchmarking; – Strong demand from the user side.	**Weakness** – Information stored as hard copies; – Some legal regulations require hard copy documents; – Inconsistent data for planning; – Weak control; – Insufficient infrastructure of the users; – Insufficient human resources.
Opportunity – Absence of port information systems makes it easier for integration; – Undersecretariat for Maritime Affairs had jurisdiction on port operators; – Support from industry, such as Chamber of Shipping, Port Operators Association, etc.	**Threat** – Privatization - implementation of various TOS types will make it more difficult for integration; – Conflict among different governmental institutions, such as Customs, Ministry of Finance etc.

6. PROPOSED PORT COMMUNITY SYSTEM FOR TURKISH MARITIME INDUSTRY

There are a lot of examples in the world suggesting that a rapid implementation of any information system without proper adjustments in the underlying applications and processes is like to fail ([13], [14]). Thus port community system development efforts must be accompanied with transformation of underlying procedures and legislation.

Based on the analysis of the current procedures and the successful examples in the world, we have proposed a three-stage transformation strategy for Turkish maritime community, as shown in Fig. 3.

1. First Stage:Automation of Information Transfer Between the Port Operators and the Harbor Master's Office: Since the current legislation requires that each port operator must be certified by the Undersecreteriat of Maritime Affairs, and the harbor masters have jurisdiction on the port operators, this stage is relatively easy to implement. The main objective of this stage is that every port operator must implement a minimum level of terminal operating system (TOS) certified by the Undersecreteriat of Maritime Affairs. This system should cover two main functions;

(1) automatically report the activities within the port area to the harbor masters' office.

(2) restrict the operations which are subject to the legal confirmation of the harbor master's office.

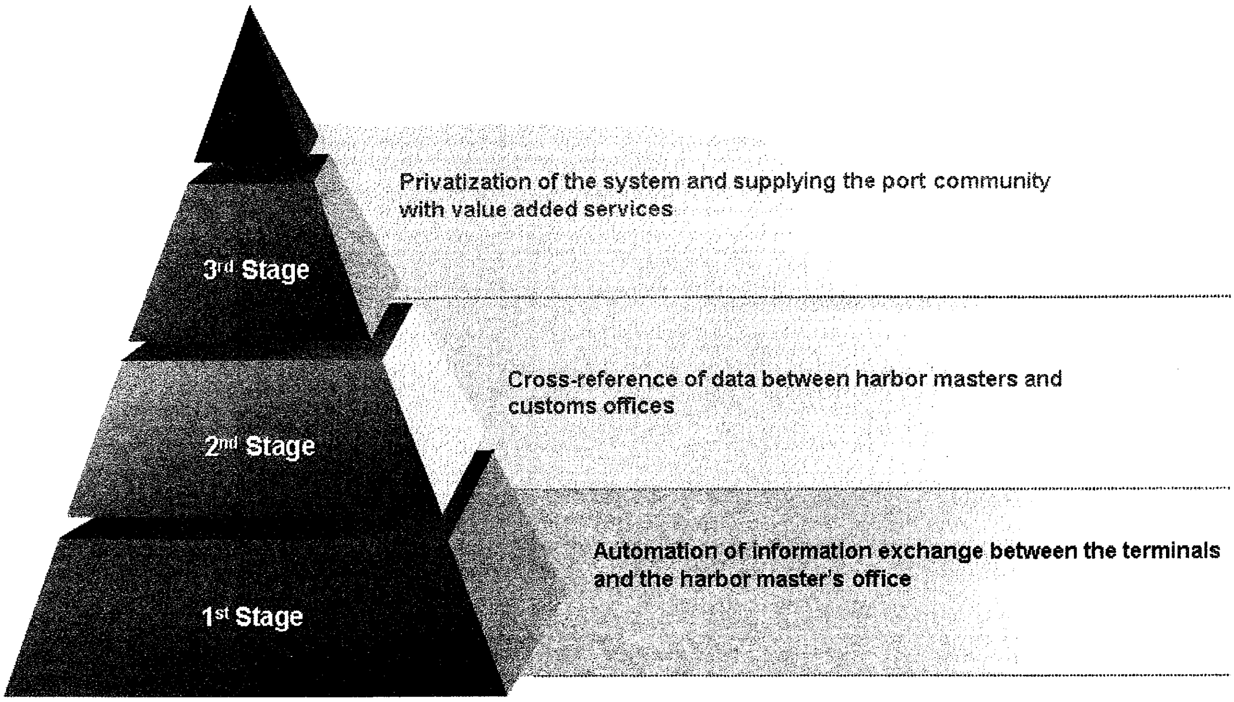


Fig. 3. Propose Strategy for Port Community Systems

The proposed port community system (PCS) is connected to ports' terminal operating systems (TOS) with and application program interface (API), where as government officers and customers can access the system through a graphical user interface (GUI), such as a web browser. The customers can log in their request through internet (1) and these requests can be transferred to the TOS of the corresponding terminal(2). On the basis of these requests, terminals can perform their operational planning and send job instructions to the equipment (3). In other words, terminal cannot perform any operation for any request without the confirmation of the harbor master's office. Upon completion of each task, equipment send reports to TOS (4) which are transfered to PCS (5). By this way, harbors office can maintain reliable statistical data which is obtained directly from the source where the data is created. The status of their cargo can be sent to the customers through a web portal or e-mail (6). Finally, the certifications and the legal requirements of the ships and the crew can be checked within the terminal area and logged into TOS via a hand terminal (7) and passed to the harbor master's office (5). The surveyors may go and check the ship when necessary.

In order to protect the privacy issues, the system does not necessarily cover any function related to the business relations (such as pricing) between the terminal operators and their customers. The information transfer is restricted to those which port operators are already supposed to report to the harbor master's office. Implementation of such a TOS would increase the efficiency of individual port and terminal operators, thus contribute to the international competitiveness of Turkish ports.

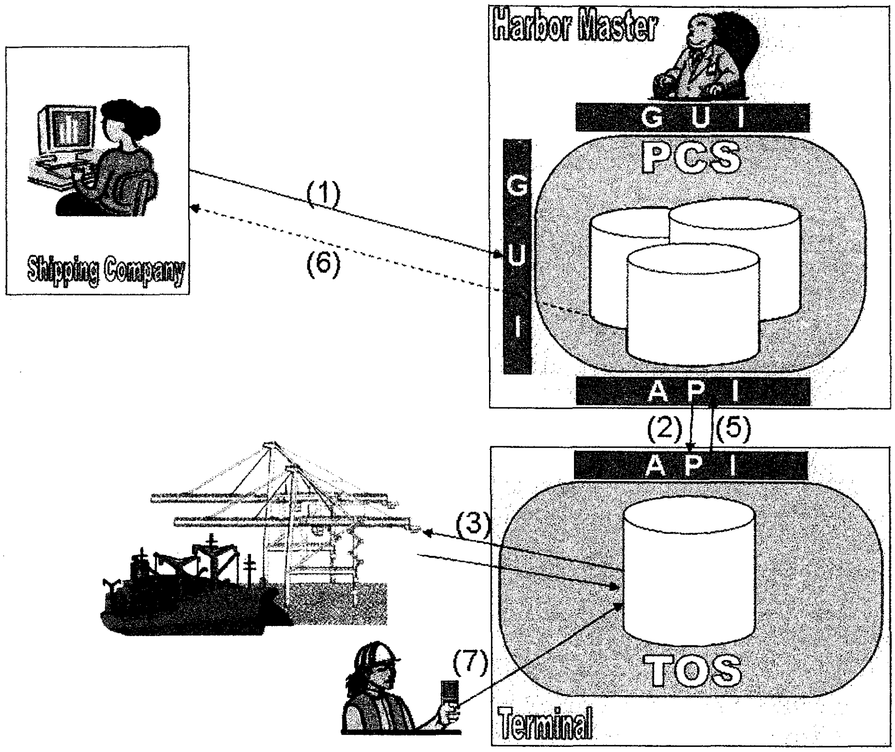


Fig. 4. First Stage of PCS

2. Second Stage: Cross-reference of Data Between the Harbor Masters and Customs Office: This stage is relatively more difficult to implement since neither the harbor masters nor the customs office have jurisdiction on the other. In this stage, an application program interface (API) would be provided between the databases of the harbor master's office and the customs office in order to check any inconsistencies in the data submitted bu the shipping companies. These inconsistencies may be intentional or accidental. In any case, when there is any inconsistency, the customs enforcement officers or port state surveyors may directly visit the ship for verification. Thus limited number of personnel can be used more efficiently by focusing on the suspicious ships.

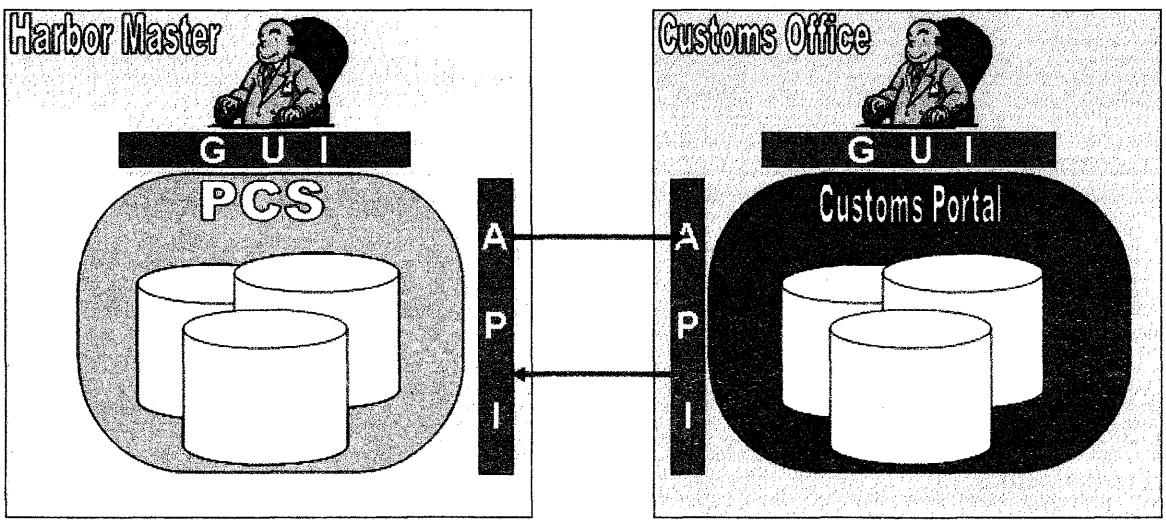


Fig. 5. Second Stage of PCS

3. Third Stage: Privatization of the Sytem and Supplying the Port Community with Valeu Added Services: The involvement of the private companies (i.e. the port customers) in the system should be left to the final stage. There are several reasons for this. There are several published cases indicating that private companies may resist to change the type of business they are used to do, and refuse to use such a system until they percieve the benefits of the new system (Keceli et al., 2007; Keceli et al. 2008). Thus the involvement of the users before the maturity of the system may cause failure.

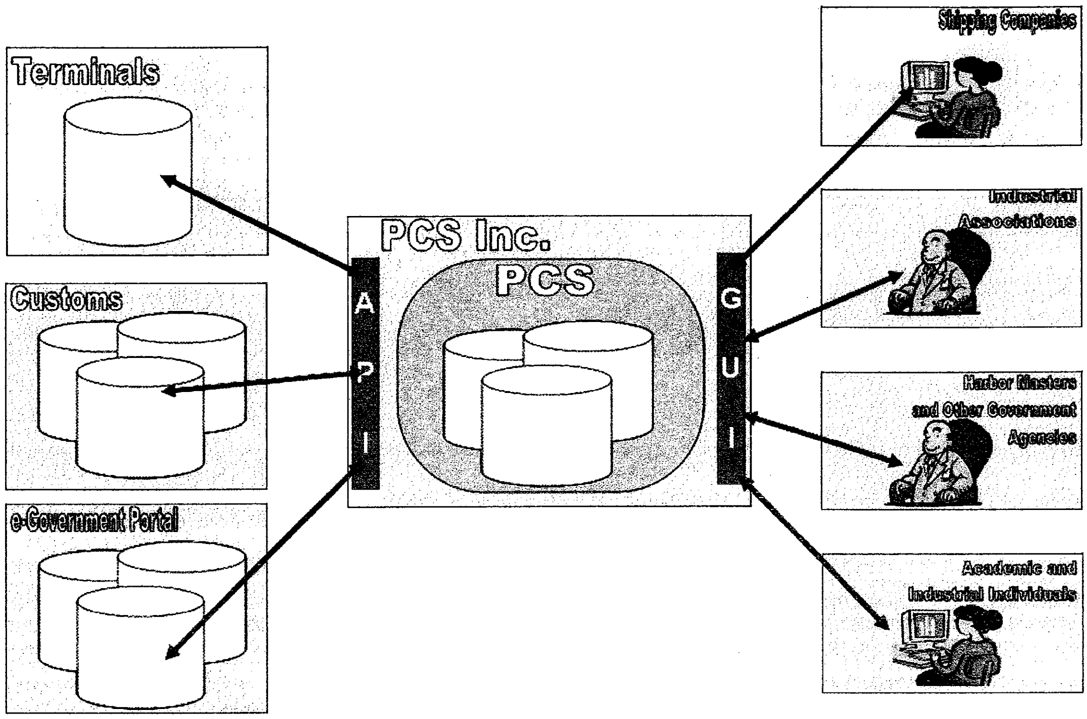


Fig. 6. Third Stage of PCS

Keceli (2008) suggests that user acceptance of port community systems directly depends on the support of the user company's top management and the technical reliability of the system. Thus, maturity of the system is not sufficient, the governmental agencies must provide good public relations with the industrial companies, such as providing training programs, seminars, incentives to ensure that the benefits of the new system is well perceived by the users.

Since it is not very practical for a governmental institute to provide commercial services, privatization of the system may contribute significantly to the efficiency of operations, quality of the services provided, and the acceptance of the system by the members of the port community. On the other hand, security and the control of the activities must be ensured by the government. Thus it is the best practice to operate a port community system by an independent corporation fully owned by the government. By this way not only commercial flexibility but also reliability and trust issues can be addressed.

7. EXPECTED BENEFITS OF THE PROPOSED SYSTEM

The expected benefits of the proposed system are summarized below:

– Performance:
  - Fast access to information.
  - Efficient use of limited human resources.
  - Strengthen control and enforcement mechanism.

– Information Quality:
  - Access to information directly from its source.
  - Decreased rates of human errors.
  - Decreased rates of inconsistency.
  - Analyzing row data to obtain more quality information for decision support.
  - Recognizing unforeseen relations among data by using online data analysis techniques (such as data mining).
  - Provide reliable data for future investments, projects and research.
– Economic Benefits:
  - Decreased cost of information access.
  - Decreased communication costs for shipping companies.
  - Extra income for government.
  - Correct taxation and prevention of smuggling via cross-referencing data submitted by the shipping companies with actual cargo handled at the terminals.
  - Prevention of illegal income (i.e. bribery).
  - Decreasing the foreign dependency on port and logistics software.
– International Competitiveness:
  - International access to online information via internet.
  - Increased international competitiveness of Turkish ports.
  - Expected increase in the number of foreign ships calling at Turkish ports for transhipment.
  - Full conformity to international security standards.
– Efficiency of Terminal Operations:
  - Incentives and support for implementation of terminal operating systems in accordance with the prospective port community system.
  - Increased level of operational standards and efficiency within individual terminals.

8. CONCLUSION

In the modern world of port logistics, information systems play a crucial role in the competitiveness of ports. Among port related information systems, port community systems are the most difficult to implement due to enormous amount of investment required and inter-organizational relations that must be established. Industrial and academic literature is full of failure cases in which private companies find it difficult, or simply refuse to use the systems developed by the governments.

Under the light of past experiences, this paper proposes an transformation strategy for Turkish maritime industry for the implementation of the port community system. The main focus of this strategy is that all development efforts must be user-oriented, i.e. close relation with the users in the industry must be maintained and the design of the system features must be based on the needs and the value perceptions of the users.

A stepwise bottom-up development approach is proposed, such that small connections between ports and harbor masters must be established first, and then the system must be expanded with additional functions. Such an approach would increase the possibility of system's success since the system would reach a certain maturity level before external organizations participate willingly. On the other hand, since harbor masters have jurisdiction on the port operators, the system can be enforced to the port operators, minimizing the resistance to the system before it reaches a certain level of maturity.

The main limitation of this paper is that port community system development in Turkey is still an ongoing process. The outcomes of this paper is supposed to provide a guideline for the policy makers not only in

Turkey but also in other developing countries. When the Project comes to an end, the evaluation of the developed system on the basis of these guidelines still remains as an important topic for future research.

References:

[1] Jeffrey, K., Recent Developments in Information Technology for Container Terminals, Cargo Systems, London, 1999.

[2] Forward, K., Recent Developments in Port Information Technology, Digital ship Ltd, London, 2003.

[3] Applegate, L.M., R.D. Dustin, F. W. McFarlan, Corporate Information Strategy and Management: Text and Cases, McGraw-Hill/Irwin, New York, 2003.

[4] http://www.dakosy.de/en/, Last Accessed on: 25.05.2009.

[5] http://coast.hhla.de/coast/index.jsp, Last Accessed on: 25.05.2009.

[6] http://www.oneport.com/eng/index.htm, Last Accessed on: 25.05.2009.

[7] http://www.tradelink.com.hk/eng/index.html, Last Accessed on: 25.05.2009.

[8] http://www.portofrotterdam.com/en/home/, Last Accessed on: 25.05.2009.

[9] http://www.klnet.co.kr/english/business_4_2.htm, Last Accessed on: 25.05.2009.

[10] http://www.ktnet.co.kr/enghome/index1.html, Last Accessed on: 25.05.2009.

[11] Vincent, S., Making EDI Work in India, Article 4: Port Community Systems and EDI in the future, Exim India, 05 December, 2003.

[12] Zygus, A., Examples of Chinese and European experiences in the application of advanced IT solutions in eLOGISTICs, Part 1:Information Management System for Port Community-Experience of European Ports, eLOGMAR-M Chinese-European Forum on eLogistics, Shenzhen, P.R. China, 2006.

[13] Keceli, Y., Choi, H.R., Park, N.K., Analysis of success factors of information systems development in Kumport and implications for other Turkish ports, WSEAS Transactions on Information Science and Applications, Vol. 4, 2007, pp. 1014 – 1047.

[14] Keceli, Y., Choi, H.R., Cha, Y. S., Aydogdu, Y. V., A Study on Adoption of Port Community Systems According to Organization Size, Third 2008 International Conference on Convergence and Hybrid Information Technology, Busan, South Korea, 2008.

[15] Rodon, J., Ramis-Pujol, J., Exploring the Intricacies of Integrating with a Port Community System", 19th Bled eConference eValues, Bled, Slovenia, 2006.

[16] Rodon, J., Ramis-Pujol, J., Christiaanse, E., A processstakeholder analysis of B2B industry standardization, Journal of Enterprise Information Management, Vol. 20, No. 1, 2007, pp. 83 – 95.

THE OFFICER SHORTAGE: HOW THE IMO AND SOME COUNTRIES HAVE ADDRESSED THE ISSUE

Barrie Lewarn,
Professor, BSc, Grad Dip Ed, PhD, Master Mariner
Maritime Transport Policy Centre
Australian Maritime College, an institute of the University of Tasmania
E-mail: sblewarn@amc.edu.au

Abstract. This paper reports on research conducted by the Maritime Transport Policy Centre of the Australian Maritime College which examines a number of different approaches that have been adopted to alleviate the officer shortage and increase the pool of skilled officer seafarers. Many of these approaches actively involve maritime education and training.

Following a brief examination of the worldwide supply and demand for seafarers, and taking account of the global financial crisis and its affect on the maritime industry, a number of the key issues which have created the current shortage of skilled and qualified officer seafarers are identified.

Having outlined the magnitude and scope of the problem, there follows an examination of the different approaches taken by five countries to address the issue. An analysis of these different approaches leads to the identification of solutions for specific situations; namely solutions for a shortage caused by:

- lack of local entrants to seafaring;
- training costs;
- lack of training berths;
- poor retention rates of trained seafarers.

A number of these solutions directly affect maritime education and training organisations.

In conclusion, the paper suggests that governments must take a lead by providing both a policy and operating environment which will ensure there are sufficient qualified seafaring officers to meet the demands of both the sea and shore based sectors of the maritime industry.

INTRODUCTION

More than 90 % of world trade is carried by sea, and without sea transport the movement of goods on the scale necessary for the modern world to function would be very difficult, if not impossible.

It is estimated that there are approximately 50,000 merchant ships trading internationally, transporting people and all kinds of goods. This fleet is registered in over 150 nations, and manned by over a million seafarers of virtually every nationality. Marisec [1]. The worldwide population of seafarers serving on merchant ships which trade internationally is estimated to be in the order of 466,000 officers and 721,000 ratings i.e. approximately 1.2 million seafarers in total. Marisec [2]. However, there are also many seafarers employed in the fishing industry as well as on vessels which operate solely within national coastal boundaries. Unfortunately their numbers remain unclear as they are excluded from most data.

BIMCO/ISF have identified the sources of officer seafarers as 29 % OECD countries, 29 % Far East, 21 % Eastern Europe, 13 % Indian sub-continent, and 8 % Africa/Latin America. The centre of gravity of the labour market has continued to shift from the traditional maritime countries of Western Europe, Japan and North America towards the Far East, Indian sub-continent and Eastern Europe. China has seen a significant increase in maritime labour supply, although most of that additional workforce is currently used by the Chinese-owned fleet to meet expanding domestic requirements. Warwick Institute of Employment Research [3].

Many countries are experiencing a shortage of skilled officer seafarers and this has consequences for both the sea and shore based sectors of the maritime industry as there are inextricable links between the skills required for both the sea and shore based sectors of the maritime industry. The results of the BIMCO/ISF surveys of seafarer supply and demand illustrate the magnitude of the problem and are summarised in Table1.

Table 1

Supply and demand for seafarers, 2000 – 2015

	1995		2000		2005		2010 estimate		2015 estimate	
	000s	%	000s	%	000s	%	000s	%	000s	%
Officers	-18	-4	-16	-4	-10	-2,1	-46	-12	-27	-5,9
Ratings	+219	+36	+224	+27	+135	+18,8	+255	+30	+167	+21,6
Note: 2010 estimates prepared in 2000; 2015 estimates prepared in 2005										

Warwick Institute of Employment Research [4].

In November 2008, the International Maritime Organisation [5] reported that maritime industry analysts Drewry Shipping Consultants assessed the current shortfall of officers in the global shipping fleet to be some 34,000, against a total requirement of 498,000. Moreover, based on Drewry's fleet growth projections, and the assumption that officer supply will only increase at the current rate, the report predicts that by 2012 the officer shortfall will have grown to 83,900. As a result of the uncertainty caused by the global financial crisis the shipping scene is currently particularly volatile and, as a consequence, Drewry recently revised the latter projection. The 2009 evaluation predicts a base case shortfall figure for 2013 of a 56,000, assuming fleet growth totaling 14,6 %. Prudently, given the growing order book uncertainty, the projections provide an alternative case which cuts this shortfall figure to nearer 43,000. While the problem may be experiencing a temporary reprieve, it has not gone away. Drewry Shipping Consultants [6]. Regardless of the accuracy of these projections, and bearing in mind the current market volatility, there is a high degree of probability that there will be a continuing worldwide shortage of officers and a surplus of ratings for the foreseeable future.

SOME KEY ISSUES

The shortage of officer seafarers is a not just matter of worldwide concern to sea transport operators because the skill sets acquired by seafarers are also needed for many jobs in the shore-based maritime sector. The nature of employment in the maritime sector is such that seafaring has traditionally been viewed as a starting point which can lead to a range of shore-based maritime careers. A recent survey of 229 serving seafarers indicated that approximately one third intended to make seafaring a lifelong career, whilst two thirds indicated they would move ashore as soon as circumstances permitted. Shiptalk [7].

Seafaring skills and experience are of direct use and importance for a range of maritime shore-based careers including pilotage, marine surveying, terminal/cargo operations, port operations, ship management, marine administration, and maritime education and training. Company of Master Mariners [8]. To further illustrate the point, sea-related employment provides about 5 million jobs across Europe, of which some 70 % are onshore, in shipping, shipbuilding, and related services and fields, ranging from cargo handling and coastal tourism to offshore energy fields, fishing and aquaculture. European Union [9]. Whilst it is true that not all these jobs require seafaring skills, it is also evident that a significant percentage are dependent upon the skills acquired by seafarers.

This flow of seafarers from ship to shore is important, as it ensures that relevant skills and experience are not lost to the maritime industry. It is generally accepted that a majority of ex-seafarers remain within the shore-based maritime industry; however, if there are insufficient new seafarer entrants, there are ultimately insufficient skilled seafarers to move to shore employment. Norwegian ship and crew management OSM Group chairman, Jan Morten Eskilt, was recently reported in Lloyd's List DCN [10] as saying: 'The best way for the shipping industry to tackle its recruitment crisis was to stop treating seafarers badly... most important of all, basic professional respect rather than pay rates.' His view is based on the fact that officers may spend up to five years in university and with that level of commitment could just as easily study professions with a higher level of respect, such as economics or law; a piece of advice that, no doubt, has general application.

Like many countries Australia is suffering from a shortage of officer seafarers; however, the Australian Shipowners Association (ASA) reports that in excess of 400 applications are received annually from people wishing to pursue a career at sea. This is without any significant effort to attract individuals or to promote the careers on offer within the industry. This places Australia in what appears to be a unique position internationally, since advice from almost every other country is that they cannot attract the young people to pursue a career at sea. ASA [11]. There is general acceptance that the level of unsolicited applicants wishing to go to sea indicates that there is a reasonable pool of young Australians interested in seafaring as an initial career, yet there is still a shortage of qualified Australian officer seafarers. The problem in Australia is not recruitment; rather it is the impediments faced in turning this pool of potential recruits into qualified officer seafarers.

A recent Maritime Skills, Shortages and Training Forum held by the Maritime Transport Policy Centre (MTPC) of the Australian Maritime College (AMC) in Melbourne, to examine the Australian situation identified three key structural impediments, namely:

- Limited availability of sea time;
- Lack of flow-through from 'brown water' to 'blue water' fleet and compartmentalisation (e.g. qualified fishers not employed in 'brown water' fleet);
- Company-centric rather than industry-wide views (e.g. prevalence of 'poaching').

In addition, the costs associated with turning new recruits into trained and certificated seafarers were identified as a further impediment and the following issues were identified:

- No incentive for industry to train, e.g. there is no tonnage tax system in Australia such as is found in the UK;
- Australian employers have to fund all costs associated with sea-time training periods;
- Training costs are borne by a few employers but benefit the whole maritime industry;
- Access to government-funded maritime traineeships is difficult. MTPC [12].

The shortage of skilled, qualified, officer seafarers is a dilemma which is not unique to Australia, in that many developed countries have faced similar problems and have tried a variety of approaches to redress the shortage of skilled personnel for their seafaring and broader maritime sectors.

ADDRESSING THE MARITIME SKILLS SHORTAGE; EXAMPLES

Several countries provide government assistance for maritime training. A variety of approaches is evident including assistance to the trainee, assistance to the training provider, assistance to the employer, and linking training requirements to beneficial commercial operating environments such as a tonnage tax regime. The mechanisms used to deliver this assistance vary from the simple to the complex depending upon the aim to be achieved. Lewarn [13].

Germany

To preserve and develop maritime skills, the German Federal Government established a Maritime Alliance between the Association of German Shipowners, the trade unions and the federal coastal states. European Union [14]. The ASA [15] records that under the Maritime Alliance there is a subsidy for wage-related ancillary costs of seafarers from the Federal Republic of Germany, as well as seafarers from the rest of the EU, employed on board German merchant ships. Additionally, there is financial support for seafarer training which incorporates a financial contribution on the part of the German Shipowners Association. In order to promote seafarer training the financial contribution of the German Federal Government was increased to EUR 30,000 per trainee from 2002. Heitmann [16] reports that the wage costs reduction measures along with tonnage tax requirements were estimated to have created 1850 jobs in 2004.

United Kingdom

The UK instigated a seafarer training support scheme as a key element of its tonnage tax regime which was, in turn, aimed at increasing the number of ships on the UK register. This imposes a minimum training obligation on companies entering the tonnage tax regime to train one officer trainee per year for every 15 officer posts in the company's effective officer complement. This scheme is administered by the UK Department for Transport through the Marine and Coastguard Agency (MCA) and provides financial assistance to training providers for the training of officers and ratings. The support available presently amounts to roughly half of the cost of training provided by maritime colleges. In 2007 – 2008 the scheme cost GBP 10.835 million, which was a 10 % increase on the previous year due to a further increase in the numbers undergoing training. MCA [17]. As a measure of the scheme's effectiveness, when it was introduced in 2000 the officer cadet intake was approximately 400 whereas by 2008 it was approximately 800. Department of Transport [18].

Ireland

The Irish Government has adopted a different approach to the maritime skills shortage issue by focusing on and encouraging seafarer training. In 1999 it established the Irish Maritime Development Office (IMDO) as a statutory government agency with responsibility for the development of the maritime sector. Amongst its responsibilities, the IMDO oversees and coordinates seafarer development including maritime education and training. The approach taken by the Republic of Ireland is to provide financial support for both the trainee, while ashore and at sea, and the maritime training institution. In Ireland the difficulty is not one of encouraging shipping companies to undertake training, but of attracting young people to the sector. For this reason the government decided there should be no commitments or financial penalties linking seafarer training to the Irish tonnage tax regime, rather the government decided to invest directly in:

- A EUR 58m state-of-the-art National Maritime College;
- New and more appropriate educational courses;
- Grants for trainee officers;
- Increased tax allowances for seafarers. IMDO [19].

Once a cadet is accepted into nautical college, training to their 1st Certificate of Competency occurs with financial support from the government's Irish Seafarer Education Assistance Scheme (ISEAS) which provides funding to 90 cadets per year. This support covers all costs for mandatory training courses and, in addition, a seagoing training allowance of EUR 350 is made available for each cadet on a monthly basis. The Irish approach, which provides government grants to cover the costs of training both ashore and at sea, seeks to attract new entrants and support ship operators which provide training berths. It should be noted that not all European governments are prepared to contribute to the on-board component of training, but those which do include Germany, Greece, Ireland, Portugal, and UK. Krishnan [20].

Hong Kong

In Hong Kong it was recognised that some seafaring experience is a valuable precursor to working in the shore-based maritime industry. In 2004 the Hong Kong Government, with the support of the Hong Kong Maritime Industry Council, set up the Sea-going Training Incentive Scheme to provide financial incentives for people to take up sea-going training as cadets, to pave the way for them to become shore-based professionals in the maritime industry. The scheme is administered by the Marine Department, and a cadet may receive as an incentive HK$ 4,000 per month during the training period. Hong Kong Maritime Industry Council [21].

The scheme had an initial allocation of HK$ 9 million and 32 applications were approved in the first year (2005); training completions were reported as 6 in 2005, 13 in 2006, whilst in 2007 it was reported that, thus far, 72 deck cadets and engine cadets had joined the Sea-going Training Incentive Scheme. Marine Department [22]. Whilst the numbers involved are relatively small, the Hong Kong approach is a good example of government and industry ensuring that there is a flow-through of appropriate skills to the shore-based maritime industry.

Norway

In an attempt to increase the skill base of the shore-based maritime sector, a traineeship program was implemented by the Norwegian Shipowners Association (NSA) in 2005. The 'Maritime Trainee' program recruits newly-qualified students with a master's degree in economics, technology, law, or equivalent qualifications from maritime university colleges, with the first intake completing its two-year program in 2007. NSA believes the scheme is unique in that it is the result of more than 20 enterprises from across the entire maritime industry: shipping companies and rig operators, shipyard and equipment industry, shipping-related services in classification, banking, brokerage and legal services, joining forces to mount a program offering trainees great breadth in both their training and networking opportunities. Equally, the trainees gain broader insights into the entire maritime industry than is possible from a traineeship with a single company. Through these postings to different enterprises, the trainees extend their knowledge of a wide range of specialist and technical fields within the entire maritime cluster, which is invaluable for their future careers and the Norwegian shipping industry. Norwegian Shipowners' Association [23].

These five approaches provide an illustration of a number of the solutions used to alleviate the shortage of skilled personnel for both the seafaring and shore-based sectors of the maritime industry. The success, or otherwise, of these approaches provides a fruitful area for further research.

REVIEW OF SOLUTIONS

The research conducted by the Maritime Transport Policy Centre of the Australian Maritime College examined a number of different approaches that have been adopted to alleviate the officer shortage and increase the pool of skilled officer seafarers. Lewarn's [24] research findings are summarised below:

Solutions for shortage caused by lack of local entrants to seafaring

These approaches tend to be either very general or relatively narrow in nature and, therefore, can be viewed as underpinning activities to the more comprehensive solutions. They include:

- Recruitment campaigns e.g. IMO [25] 'Go to Sea' campaign;
- Second register e.g. allows labour laws to be modified to employ seafarers who are not nationals; thus reducing pressure on the number of local seafarers needing to be employed;
- Making qualified seafarers a priority immigration category;
- Attracting ex-seafarers by use of a sign-on bonus, part-time employment etc.

Solutions for shortage caused by training costs

Some countries provide direct financial support/incentives for maritime training. This support may be available to some or all of the following:

- Trainees, e.g. financial incentive to cover training costs ashore and/or afloat;
- Ship operators, e.g. financial incentive to assist with costs of employing/training a seafarer ashore and/or afloat;

- Maritime education and training institutions, e.g. financial incentive to assist with costs of providing seafarer training courses.

Solutions for shortage caused by lack of training berths

Increasing the number of ships on a country's register, by using the right incentives to attract ship operators, can increase the number of training berths available. As part of their tonnage tax regime, some countries link a requirement to provide training berths to the incentives used to attract additional ship operators. Well-tried and tested incentives to attract ship operators include:

- a tonnage tax regime;
- the creation of a second/international register;
- financial incentives/subsidies.

Solutions for shortage caused by poor retention rates of trained seafarers

These solutions tend to focus on financial incentives to retain seafarers at sea and keeping maritime skills in the broader maritime industry by improving career prospects. These approaches include:

- Providing loyalty bonuses for seafarers to remain at sea for 'x' years (with financial penalty for leaving early);
- Improving the professional recognition and treatment of seafarers, as well as providing adequate employment conditions;
- Sponsoring training/professional development to progress a career within a company;
- Supporting career progression, sea, sea to shore, and ashore as part of the employment package.

Underpinning these solutions are two fundamental, but common, government policies namely; creation of a commercial ship operating environment that reflects the important requirement for a robust national maritime skills base; and support for the users and providers of maritime education, training and research.

CONCLUSION

Governments in many developed countries have recognised that a problem exists, and accept that they need to find and fund the solution. The critical requirement is to fund an operating environment which ensures national flag ships are competitive. Once this is in place, associated issues such as training costs and lack of training berths can be successfully resolved.

In conclusion, and in the context of the maritime skills shortage, a government-supported operating environment ensures:

- National flag ships are competitive, which;
- Increases the attractiveness of the national ship register, which;
- Increases the number of national flag ships, which;
- Increases the number of training berths available, which;
- Provides opportunities for increased numbers of trainees, which;
- Increases the maritime skills base, and
- Reduces/eliminates the maritime skills shortage.

References

[1] Marisec, Overview, 2008. http://www.marisec.org/shippingfacts/worldtrade/index.php. Accessed 7 April 2009.

[2] Marisec, Numbers and nationality of world's seafarers, 2005. http://www.marisec.org/shippingfacts/worldtrade/world-seafarers.php . Accessed 7 April 2009.

[3] Warwick Institute for Employment Research, University of Warwick, BIMCO/ISF Manpower 2005 Update: The Worldwide Demand for and Supply of Seafarers, Summary, BIMCO/ISF, London, 2005, p. 1&3.

[4] Warwick Institute for Employment Research, University of Warwick, BIMCO/ISF Manpower 2005 Update: The Worldwide Demand for and Supply of Seafarers, Summary, BIMCO/ISF, London, 2005, pp. 2 – 3.

[5] IMO, Go to Sea: A campaign to attract entrants to the shipping industry, 2008. http://www.imo.org/includes/blastDataOnly.asp/data_id%3D23804/Gotosea!campaigndocument.pdf. Accessed 24 November 2008.

[6] Drewry Shipping Consultants, Manning 2009, 2009. http://www.drewry.co.uk/news.php?id=38 Accessed 7 April 2009.

[7] Shiptalk, Life at Sea Survey 2007/8 – Seafarer attraction & retention survey report, Shiptalk Ltd, Gateshead, 2008. http://www.shiptalkjobs.com/survey_results/Attraction_and_Retention_Survey_Report.pdf. Accessed 16 April 2009.

[8] Company of Master Mariners of Australia, Submission 9, Coastal Shipping Policy and Regulation Inquiry, House of Representatives Standing Committee on Infrastructure, Transport, Regional Development and Local Government, Company of Master Mariners, Brisbane, 2008.

[9] European Union, European Maritime Policy: Jobs, 2007. http://ec.europa.eu/maritimeaffairs/pdf/thematic_factsheets/jobs_en.pdf . Accessed 29 August 2008.

[10] Lloyd's List DCN, 'Treat them with respect', 27 November 2008, p. 13.

[11] ASA, Submission 29, Coastal Shipping Policy and Regulation Inquiry, House of Representatives Standing Committee on Infrastructure, Transport, Regional Development and Local Government, ASA, Melbourne, 2008, p. 44.

[12] MTPC, Synopsis: Maritime Skills, Shortages and Training Forum, AMC, Launceston, 2008, p. 8.

[13] Lewarn B, A review of some solutions to the shortage of maritime skills, MTPC, AMC Launceston, 2009, p. 12.

[14] European Union, EU Maritime Policy: Facts and Figures, Germany, 2007. http://ec.europa.eu/maritimeaffairs/pdf/country_factsheets/germany_en.pdf. Accessed 18 November 2008.

[15] ASA, Submission 29, Coastal Shipping Policy and Regulation Inquiry, House of Representatives Standing Committee on Infrastructure, Transport, Regional Development and Local Government, ASA, Melbourne, 2008, pp. 116 – 117.

[16] Heitmann J, The German Shipowners' Association, presentation to WISTA Conference, Hamburg, 15 September 2005, p. 16 http://www.wista.net/fileadmin/user_upload/Germany_files/DOC_CONFERENCE/tonnagetax.pdf. Accessed 16 April 2009.

[17] Marine and Coastguard Agency, Annual Report 2007-2008, The Stationery Office, London, 2008, p. 57. http://www.official-documents.gov.uk/document/hc0708/hc06/0617/0617.pdf. Accessed 16 April 2009.

[18] Department of Transport, UK Seafarer Statistics: 2007, 2008. http://www.dft.gov.uk/pgr/statistics/datatablespublications/maritime/seafarer/ukseafarerstatistics2007. Accessed 17 December 2008.

[19] IMDO, Irish Tonnage Tax: Delivering Global Competitive Advantage, 2008. http://www.imdo.ie/pdf/section1.pdf. Accessed 18 November 2008.

[20] Krishnan M, National Strategy for Maritime Education and Training, Ireland, 5 June 2008. http://nsr.nm-uni.eu/download/doc_view/31-s1-m-krishnan?tmpl=component&format=raw. Accessed 18 November 2008.

[21] Hong Kong Maritime Industry Council, Sea-going Incentive Training Scheme, 2007. http://www.mic.gov.hk/text/eng/seagoing/index.htm. Accessed 18 November 2008.

[22] Marine Department Hong Kong, Sea-going Training Incentive Scheme cadets receive award, Press releases 24 June 2005, 24 July 2006, 4 April 2007. http://www.mardep.gov.hk/en/home.html. Accessed 18 November 2008.

[23] Norwegian Shipowners' Association, Annual Report 2007, NSA, Oslo, 2008, p. 19. http://www.rederi.no/default.asp?V_ITEM_ID=881. Accessed 18 November 2008.

[24] Lewarn B, A review of some solutions to the shortage of maritime skills, MTPC, AMC Launceston, 2009, pp. 18 – 19.

[25] IMO, Go to Sea: A campaign to attract entrants to the shipping industry, 2008. http://www.imo.org/includes/blastDataOnly.asp/data_id%3D23804/Gotosea!campaigndocument.pdf. Accessed 24 November 2008.

FORWARD INTEGRATION: A STUDY IN ALTERNATIVE MARITIME EDUCATION TECHNIQUES

Peter J. Hayes,
Capt., JD, MA, BS
Associate Professor, Department of Marine Transportation
California Maritime Academy
E-mail: phayes@csum.edu

Abstract. *Many institutions have abandoned broad-spectrum integration of essential nautical training knowledge and skill sets in favor of modular education. Those topical areas in follow-on courses where instructors note deficiencies are remediated squandering valuable instruction time. A study conducted aboard the Training Ship Golden Bear (during its 2008 annual training cruise) followed by post-requisite courses provided data which strongly suggests that early introduction of a wide-range of nautical skill-sets introduced informally (as to grading), and reinforced, in follow-on courses effects better long-term student retentiveness of curricular fundamentals.*

Approximately eighty students were inculcated in a broad variety of basic navigation and radar plotting skill sets external to traditional grading schemes. Opportunity to utilize these skills during the training cruise motivated student participation. Student progress was monitored through the first exams (approximately one quarter of the semester) in the post-requisite terrestrial navigation and RADAR/ARPA courses. Results were correlated against results of the control group (the previous year's students).

Survey data results strongly support the conclusion that student interest is elevated and maintained by learning professional skills in an alternative environment; additionally, objective data indicates that students retain these skills at, or above, the competency level and are able to apply them without remediation.

1. INTRODUCTION

Aristotle said, "That which we must learn to do, we learn by doing." Planned repetitive instruction in experiential-learning environments is a demonstrated and accepted tenant of learning. But maritime educators are caught in the crux between remediating students in fundamental skill sets and pressing forward to introduce the advanced knowledge materials in their courses due to a lack of broad-based re-enforcement of foundational skills. Room in our already over-full training curriculums must also be made for the newer technologies without sacrificing core competencies. Increasing public and industry scrutiny of incidents in the profession necessitate personnel assessment at higher competency levels. Additionally, maritime educators aspire to produce the best-trained entry-level mariners from their universities.

Over the past fifteen years, many maritime universities have segmented maritime skill sets in order to more easily account for those which fall under the mandate of the International Maritime Organization's (IMO) convention on the Standards of Training, Certification, and Watchkeeping of 1995 (STCW 95). The Convention's guidelines set the minimum standards for the assessment of demonstrated and knowledge-base competencies for the documenting and licensing of deck and engine mariners whose duties include Bridge and Engine Room watchstanding, respectively. The trend towards this segmentation has been further exaggerated by the periodical imposition of post-STCW 95 technical certifications levied upon the already overburdened maritime curriculums.

The STCW 95 assessment standards mandate a solitary assessment event of demonstrated competencies (in some instances, after an approved training period). The convention also requires that training facilities identify in which course and what manner the assessment will occur. The door, then, has been wide open to formally teach all skill sets solely in these "identified" courses thus reducing more broad-based re-enforcement and creating openings in the curriculum for new required materials or for a cumulative reduction of unit load. The result has been a reduction of deep-seated foundational nautical skill sets in maritime students. Many instructors are forced to expend a significant portion of the post-requisite courses remediating students in these skills. The impact is not measured as only a delay in coursework but as actual negatively aggregated learning: portions of the course work (typically, advanced materials from the terminus of the class) are never introduced.

The detrimental results have a ripple effect as much of the follow-on curriculum has to compensate for the student lack of curricular fundamentals. The students themselves are not incognizant of the situation. If the instructor remediates, the students quickly realize the aggregate loss of topical material; vice-versa, if the instructor presses on, forcing new materials upon the unprepared student, learning is frustrated and can create widespread apathy and disillusionment with the course of study.

The purpose of this study was to examine the effects on student retention of several nautical skill-sets assessed informally (as to grading), and reinforced, in follow-on courses; in particular, whether this particular methodology of experiential learning with non-formal assessment parameters has any significant impact on student learning from objective and subjective perspectives.

BACKGROUND

Non-formal learning in education has been an underlying foundation system for centuries. In maritime education at the implementation of STCW, this process changed when efforts shifted to accounting for each and every competency into identified single courses; the universities adopted the rubric scheme of tracking competencies and, in the redesigning of curriculum, many eradicated broader spectrum and less-structured training. The rubric-driven system determined that a single assignment of skill-set learning and assessment met the established international criteria and required no other introduction or re-enforcement. Many educators question the validity of such a system and believe the quality of such teaching pedagogy is suspect.

Re-introducing non-formal experiential training back into the curriculum entails creativity and flexibility. An opportunity is presented to build bridges between different methods of teaching and learning in traditional maritime university systems. This opportunity does not involve a return to past systems but partnerships between and among alternative education techniques within a formalized framework to create new curriculum. Crucial to this change is the reorientation of formal vocational education to student-outcome-based objectives. Bjømåvold [1]. The validity and reliability of non-formal experiential training no longer competes with the grade-based formal education or the competency rubric.

The non-formal experiential approach to learning is advantageous to students as an alternative, or additional, method to traditional implicit education. In the absence of pressure to demonstrate learning under the graduated formal process, students tend to perform at higher levels, instituting self-induced performance stresses. Some of these stresses are competitive by nature; others are induced by real engagement – the desire to learn. Inspired to work at their own pace, the non-formal experiential learner typically advances at an advanced pace through topic materials.

Additionally, non-formal training systems mesh into situations where traditional formal education systems are challenged by excess student numbers; in particular, where this training is involved at the pre-requisite to competency assessment level. The flexibility of non-formal training models encourages recurrent learning. Guggenheim [2]. As a result, students engaged in experiential learning outside the formal grade demands retain these skill sets with a net effect of reducing both remediation burdens and failure rates.

The non-formal methodology incorporates experiential competencies within validation principles. No progressive curriculum system exists without the express obligation of measuring learning outcomes. edefop [3]. However, in a well designed non-formal learning program, a number of competencies may be assessed discretely; whereby students are engaged at the point where they have no awareness of assessment performance.

METHODOLOGY

The study was conducted aboard the university's training ship, the United States Training Ship Golden Bear (TSGB), during the two-month training period in the late spring of 2008. Deck students are required to spend two training periods aboard the TSGB; the first cruise, after their first year of academics, is CRU 100, the second cruise, after their third year of academics, is CRU 300. Deck students are also required to successfully complete a third at-sea training period as a cadet aboard a commercial vessel; students complete this training after their second year of academics. The study focused on students on their first training cruise (CRU 100). As the study was conducted as an experiment in learning, all third-class cadets were required to participate. The study followed the progress of those students who then completed the post-requisite courses in terrestrial navigation (NAU 102 Navigation I) and RADAR (DL 325 RADAR/ARPA) as far as the first graded assessment instruments.

CRU 100 includes four training sections: Bridge WatchStanding, Vessel Maintenance, Practical Training, and Professional Training. Each section is conducted over two five-day training rotations. The experiment was conducted during the Professional Training sections. Basic introductory navigational skills were introduced over six days for a total of twenty-two hours; introductory radar plotting skills were introduced during the morning afternoon periods (three hours each) for two days. CRU 100 is unique from the post-requisites identified previously as it is graded as a Credit/No-Credit course rather than a graded (A, B, C, etc.) course. The multiple sections allow for reduced class sizes (approximately sixteen students per section) – essential for necessary one-on-one skill set introduction in this area. Student participation and successful completion of assigned problem-based learning utilizing the introductory skills were the only formal criteria for the experiment.

The navigation experiment and the radar experiment were conducted independently; due to scheduling requirements, portions of the two experiments were conducted on the same day. The navigation experiment consisted of traditional 45 to 60 minute lectures followed by 60 minute problem-based exercises in chart familiarization, introduction to plotting, near-coastal sailing, fundamentals of celestial navigation, and compass error and gyro error determination. The RADAR experiment included basic radar plotting techniques utilizing paper plots and vector analysis techniques following traditional collision-avoidance rules as well as the Seagull™ computer-based-training "RADAR Observation and Plotting". The Seagull™ training required completion prior to the commencement of the Radar coursework.

The navigation problems utilized the United States Coast Guard approved training charts for license which cover Block Island Sound, Long Island Sound, and Chesapeake Bay Entrance. The chart problems were sequential, requiring correct plotting techniques in order to progress to the question. The gyro error problems made use of the publication method for azimuths using the *Nautical Almanac* and *Pub. 229 Sight Reduction Tables for Marine Navigation* and students were required to obtain real-time sights of the Sun using a bearing circle and one of the TSGB's Bridge-wing repeaters.

Participant perception surveys were administered at the end of the second training rotation for each group; students indicated the extent, on a five-point Likert scale, to which they agreed or disagreed with each survey statement. Individual subject matter for each experiment was surveyed through identified statements; several of the survey statements were pointed towards the combined components of the experiments. Additionally, the CRU 300 students were administered similar surveys to determine their perceptions of the underclass training. The topics covered in the navigation experiment were identified in the first exam of the post-requisite course, NAU 102. Only participant grades were recovered as several NAU 102 students were either repeating the course or were not otherwise subjected to the experiment.

The control group for the navigation course was the previous year's students (2007). The results of sixty-five participants were tracked through this process. The experiment's RADAR materials aligned with the first DL 325 plotting assessment. Only twenty-three of the participants' data was available from the post-requisite RADAR course (two sections). The control group for this portion of the experiment was drawn from two sections from the previous year (2007) who were also members of the first control group.

The survey data, navigation exam results, and RADAR assessments were amassed and entered into Microsoft Office Excel 2003. The data was then imported into Statistic Package for Social Sciences (SPSS) version 16.0 software for analysis. The Independent Samples t-test was conducted on the navigation and RADAR data to whether determine statistical significance of the experiment existed (see Table 1). The survey data were analyzed for inaccuracies and inconsistencies and were found to be statistically acceptable.

FINDINGS

Participants in the experiment earned 5.652 grade-points more than the control group on the NAU 102 exam. The standard deviation for the DL 325 portion of the experiment indicated those results statistically unreliable; however, the mean of the participant group was 1.878 grade points higher than the control group. Participant and 1/C surveys indicated that students valued the non-formal experiential training for immediate use (aboard the TSGB) and for post-requisite coursework.

The data indicates that student retention of the skill-sets was higher using the non-formal learning approach. Causative factors may include non-tracking of participants and control group students who were repeating the NAU 102 and DL 325 courses; if any of either faction existed, they would have already had more exposure to the skill-sets measured than first-time students; additionally, the data was collected over a relatively short period of time and the sample for DL 325 included only one-third of the expected available data.

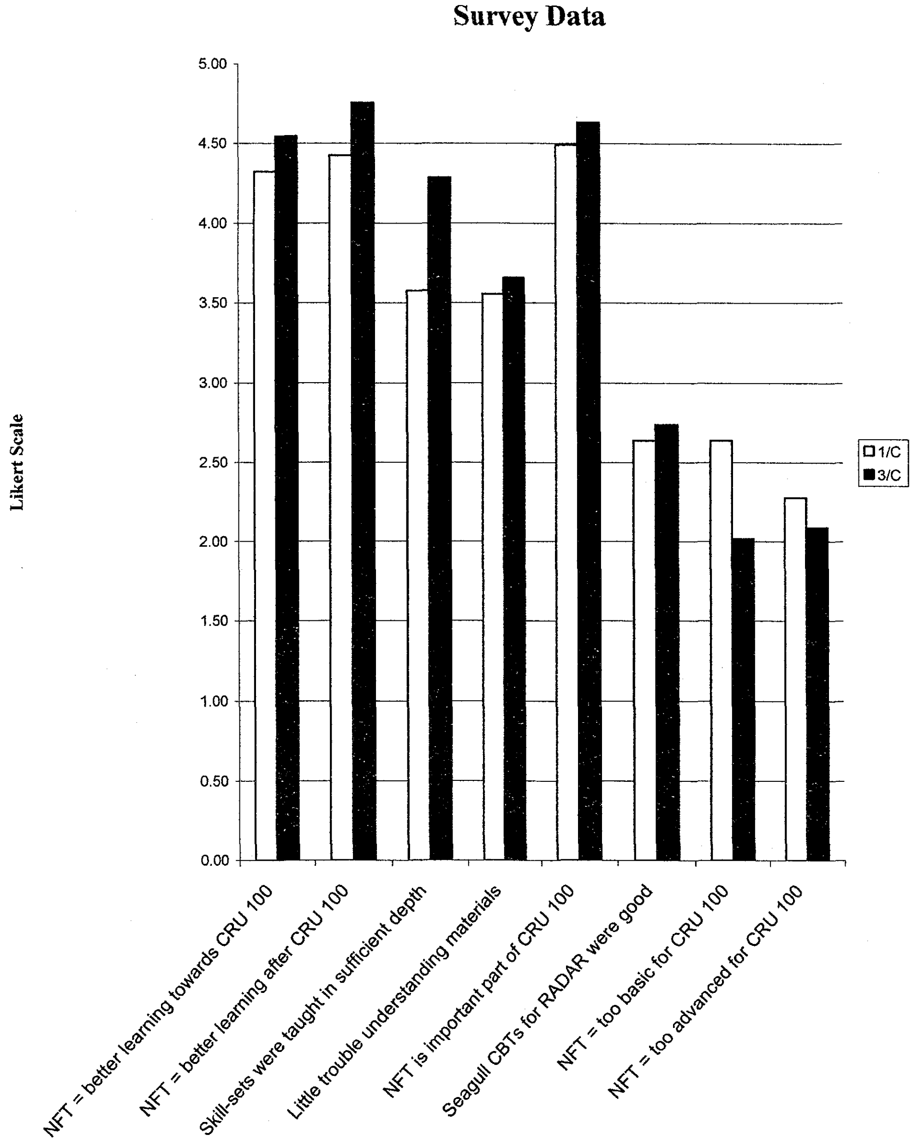
Table 1

Statistical variances for post-requisite courses

	Cruise Year	N	Mean	Std. Deviation	Std. Error Mean
Nav I 1st Exam (12,5 % of final grade)	2007	84	71.417	16.6771	1.8196
	2008	65	77.069	11.8058	1.4643
Radar 1st Plotting Exam (90 % to pass)	2007	25	81.600	19.9332	3.9866
	2008	23	83.478	18.9757	3.9567

All of the participants felt that the scope and depth of the training was optimal while the CRU 100 students advocated a more rigorous approach (see Table 2, "Skill-sets were taught in sufficient depth"). Interesting to note was the almost unanimously negative response to the computer-based-training component. Subjective comments solicited from both survey groups specified that the Seagull™ training was too advanced and better suited as a post-requisite-course re-enforcement learning device. The participant enthusiasm for learning the skill-sets was high and the post-requisite courses instructor noted the academic advantage participants enjoyed in the first weeks of the courses.

Table 2



CONCLUSIONS

The study substantiates the concept of re-introducing non-formal training by integration with established formal training systems in maritime education. The argument is not an attempt to return to past structures. Instead, the maritime education community should bring forward those relevant and proven past training techniques and integrate them in existing curriculum. The data indicates that students engaged in this learning mode perform at increased levels in follow-on courses. While the data for the RADAR plotting skill-sets in the follow-on course was statistically sparse, the trend there, as well as the substantive data results in the navigational skill-sets experiment, largely underscore the benefits of non-formal training. Further, the participant and 1/C survey data indicates that the students recognize the value of the opportunities presented by this training.

Two of the highest perceived benefits of the survey data draw attention to the bearing of the non-formal experiential program: the immediate application of skill-sets. The survey statements invited the participants and 1/C to indicate the level of relevance of the training aboard the ship. The responses indicate the usefulness of the learning throughout the contemporaneous training period. The obvious integration focuses on Bridge Watchstanding; while the participants' responsibilities were directed towards basic duties, they now understood the l/C concurrent activities' effects on the ship within the micro-environment of the voyage plan. The return-on-investment of attitude and aptitude using this methodology of training rises dramatically when incorporated into the formal education system.

Future studies in this area may tend to create a more comprehensive measurement scheme. While the RADAR plotting instruments effectively measured the skill-sets in that portion of the experiment, the navigation instrument included materials beyond the scope of the experiment. The expectation is that a more concise metric would reflect an even greater statistical result in favor of non-formal training. Finally, no instrument was utilized in the post-requisite courses that measured participant engagement. The experiment itself was not designed to extensively measure engagement but the resultant qualitative survey data strongly supports the need for further research in this area.

ACKNOWLEDGEMENTS

The author would like to thank Captain Samuel R. Pecota for his assistance in conducting the experiment and editing the process, Captain Mark Hensley for providing post-requisite course data and performance observations, and Ms. Mindy Drake for her research assistance.

References

[1] Bjømåvold, Jens, "Identification, assessment and recognition of non-formal learning: European tendencies," *AGORA V: Identification, Evaluation, and Recognition of Non-Formal Learning* Proceedings, March 15 – 16, 1999, p. 13.

[2] Guggenheim, Eric Fries, "Mobility and Social Cohesion," *AGORA V: Identification, Evaluation, and Recognition of Non-Formal Learning* Proceedings, March 15 – 16, 1999, p. 53.

[3] Cedefop, "Identification, validation and accreditation of prior and informal learning: United Kingdom report", Scottish Qualifications Authority – SQA. Office for Official Publications of the European Communities, 1997, p. 11.

Author Index

The 10th Annual General Assembly

MET Trends in the XXI Century: Shipping Industry and Training Institutions in the global environment – area of mutual interests and cooperation

Edited by
Vladimir Loginovsky

Тенденции подготовки морских кадров в XXI веке: судоходная индустрия и учебные заведения в глобальном пространстве взаимных интересов и сотрудничества

под ред. проф. д-ра техн. наук В. А. Логиновского

ИЗДАТЕЛЬСТВО
ГМА им. адм. С.О. Макарова

199106, Санкт-Петербург, Косая линия, 15-А
тел./факс 812 -322-33-42, 322-77-26
www.gma.ru
e-mail:izdat@gma.ru
e-mail:reklama@gma.ru

Ответственный за выпуск Сатикова Т.Ф.
Компьютерная верстка Савина Н.А.

Подписано в печать 07.09.2009
Формат 60×90/8. Бумага офсетная. Гарнитура Times New Roman
Усл. печ. л. 50,5. Тираж 150 экз. Заказ № 252/09