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Investigation of Watchkeeping Officers' Watches Under The Working Hours Ineligible to STCW Regulation

H. Yılmaz, E. Başar & E. Yüksekyıldız
Karadeniz Technical University, Maritime Transportation & Management Engineering, Trabzon, Turkey

ABSTRACT: In parallel with the increase in the volume of world trade, cargo handling rates and seafarers' pace of work has increased. Although the STCW regulations and restrictions on working hours has improved, this tempo has brought with it insufficient resting hours, especially in short sea transport. It is known that individuals under stress and intensive workloads are more prone to making mistakes due to fatigue. In this study, the officers' working hours are simulated in full-mission simulator at short sea transport to investigate errors made during the navigation and port watches. For this purpose, the data were obtained from 7 volunteers watchkeeping officers with the help of video monitoring and check lists in the full-bridge simulator system and also, system records in cargo handling simulator. With this study, introduced what types of errors made during navigation and port watches by watchkeeping officers under the intense pace of work. And the errors are evaluated under the legislation of international maritime. As a result, to comply with the limitations of working hours, it is necessary to increase the number of officers responsible for operations on short sea transport.

1 INTRODUCTION

The decisions taken and arrangements performed in maritime world have always, from ever history, based on the previous incidents, accidents and losses. The importance of human factor in the marine accidents, which cause great damages on nature, economy and maritime companies, have been officially considered with the acceptance of the subjects "*the requirement of focusing on human activities for the safe operations of the vessels and the need for providing a high standard of safety, security and environmental protection aiming to obtain an eminent reduction of maritime accidents"* and "*high priority of human factor issues in the working program of the Organization since plays an important role in the prevention of sea accidents"* by International Maritime Organization (IMO, 2004).

The human based errors cause more marine accidents when compared to equipment based errors (Shea and Grady, 1998). The human error has been started to be accepted as the main reason of collision, running aground and petroleum leakage etc. marine incidents. At the same time, according to many research and analyses, nearly 70-80% of the marine incidents have been caused by the human errors (Arslan and Er, 2007). The statistics of IMO related to the global figures of marine accidents have established the share of human error as between 80% and 85% (Ece, 2008).

The concept "Error" is being defined as "the fault performed without intention, purpose or desire"; as well as the definition "the person or the institution not able to demonstrate the behaviour in compliance with the requirements of the situation and time"

(Çakmakçı, 2001). According to Human Factors Analysis and Classification System (HFACS), the human error coverage also includes the unsafe/dangerous actions of the operators, the preparatory conditions of unsafe/dangerous actions, incompetent audit and organizational effects. The human error may be classified as errors based on skills, decision errors and perception errors. The reasons of the errors are physical and technological surrounding factors, psychological and physical situation of the operator, human resources management and personal underlying/preparing factors such as rest and alcohol usage and organizational factors such as insufficient allocation and maintenance of resources and incompetency of audits. If we consider the watchkeeping officer as the performer of any error or breach during the voyage of a vessel, then we may also take the individual factors such as stress, physical and psychological fatigue, motivation, work load and working hours etc. and the surrounding factors such as angle of view and length of the bridge, lighting and visual obstructions etc. as the factors affecting the error (Reason, 1990; Shappell and Wiegmann, 2000).

With the ever increasing emphasis placed on the human factor in marine accidents in the recent years, the studies of IMO and other researchers with human focus have demonstrated a rise. Fatigue and human errors naturally are within the scope of such studies. The maritime accidents, indeed, may be defined as catastrophic incidents when considered the number of people in the ships, environmental damages and the values of the ships and carried cargos (Chauvin, 2011).

According to the Marine Accident Investigation Branch (MAIB) data, 2031 vessels, 100 GT and greater commercial vessels registered in UK sea registry, have participated to the marine accidents between 1998-2011 years and 20 vessels among such accidents have been lost (MAIB, 2012). French Marine Accident Investigation Office (BEAmer) have reported a total of 418 marine incidents for the period 2004-2011 (BEAmer, 2004-2011). According to the Federal Bureau of Maritime Casualty Investigation (BSU) data, 60 marine incidents have occurred including commercial vessels in German waters in the year 2010 and 89 incidents in 2011 (BSU, 2011). Marine Casualty Investigation Board (MCIB) has reported that the number of ships participating in marine incidents through 2002-2010 had been 123 (MCIB, 2011). The Standing Commission for Maritime Accidents and Incident Investigations (CIAIM) has stated 41 marine incidents in 2009 and 91 marine incidents in 2010 (CIAIM, 2010; 2011). The Swedish Maritime Administration (SMA) data show us that 1294 accidents had occurred in Swedish registered ships between 1997 and 2006 and also 1555 near miss incidents (SMA, 2007). According to Latvia Division for Investigation of Marine Accidents (DIMA) data, the total number of accidents/incidents is 140 between the years 2004-2009. 92 of these incidents have been realized in Latvian waters and 48 out of Latvian waters. Again DIMA reports that 55 incidents have been faced in relation with fishing vessels between the years 1993 and 2009 (DIMA, 2009). Danish Maritime Authority (DMA) has stated 435 marine incidents in Danish waters between 1998 and 2007 (DMA, 2008). 466 incidents have been experienced by the commercial vessels, and 325 marine incidents by fishing vessels, with Denmark and Greenland registry between the years 1999 and 2008 (DMA, 2009). The Accident Investigation Board of Finland (AIBF) has reported 59 accidents for the period between 2002 and 2006 (AIBF, 2007). The more we deepen the statistics and data sources related to marine accidents the more we may understand the real numbers of accidents are not limited with the aforementioned figures.

The losses of live and commodity have been faced in such marine incidents as well as caused environmental pollution and economic damages. The subjects being focused on happened to include the originating environmental problems and examination of marine accidents, in time.

This study aims to determine what kind of mistakes made by the watchkeeping offiers under intense pace of work. Further studies will shed light on is considered.

1.1 *Watchkeeping Officer and Working Hours*

Certain functions shall continue uninterruptedly 24 hours in the vessel environment and the works to be performed by the humans shall be arranged as to provide resting periods. Thus, working in shifts in accepted for such kind or works. The watchkeeping officer is the deck personnel with complete information about the locations and functions of all the safety and navigational aids on the vessel. The watchkeeping officer is responsible for the safe navigation of the vessel, under the general instructions of the master, as for preventing the collisions and running aground. These officers are also responsible for performance of the operations in a manner not jeopardizing the persons, vessel, cargo and the port in their port watches as well protecting the marine and surrounding environment (IMO, 2011).

The working hours and resting periods of the watchkeeping officers are arranged under the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) with 2010 Manila amendments (IMO, 2011). Seafarers' Hours of Work and the Manning of Ships Convention (C180) also provides arrangements on working hours in compliance with STCW. The working hours of the seamen have also been arranged under European Union Directives and national regulations of the countries. Table 1 summarizes the information related to the working hours and resting periods of the seamen under STCW and C180 conventions, European Union Directives Nr.1999/63/EC (European Union, 1999) and Nr. 2003/88/EC (European Union, 2003) and applicable Turkish Seamen Regulations (Official Journal, 2002).

It may be the case as noncompliance to the working hours aforementioned, over working and, accordingly, fatigue. It is known that over working is a factor that triggers the fatigue and, in relation, the human error (IMO, 2001).

Table 1. Regulatory arrangements related to the working hours of the seamen

Legislation	Daily resting hours	Daily resting periods and intervals	Weekly resting hours	Daily working hours	Weekly working hours
STCW*	Min. 10 hours	– Max. two periods, one of which shall be lest 6 hours – Intervals between periods shall not exceed 14 hours	Min. 77 hours		
C180	Min. 10 hours	– Max. two periods, one of which shall be lest 6 hours – Intervals between periods shall not exceed 14 hours	Min. 77 hours	Max. 14 hours	Max. 72 hours
1999/63/EC	Min. 10 Hours	– Max. two periods, one of which shall be lest 6 hours – Intervals between periods shall not exceed 14 hours	Min. 77 hours		
2003/88/EC	Weekly working hours shall be max. 48 hours and comply with STCW and C180.				
Seamen Regulations	Min. 10 hours	– Max. two periods, one of which shall be lest 6 hours – Intervals between periods shall not exceed 14 hours	Min. 70 hours (Including emergency situations)		

*Including Manila 2010 arrangements

2 METHODS

It is a known fact that the increased working hours and difficulties of the working environment is an important factor towards the tiredness of the seamen. This study has been conducted to determine the errors of the watchkeeping officers subject to excessive working hours during their watches; and, camera monitoring system and check lists have been used in the full-mission bridge simulator environment whereas the system records have been used for liquid cargo handling simulator. This study has been performed with healthy 7 male volunteers, between 22-24 age interval (average age 22,3), who have the competency of unlimited watchkeeping officer. During the data collection stage, the tanker simulator has been used for total 245 hours and the bridge simulator for total 154 hours. Each volunteer is worked with total 8 days of which 1 day to be preparation day. The volunteers have been observed during a one week program carried out.

2.1 *Weekly Working and Resting Program*

The studies related to the topic of fatigue in maritime profession have shown that the fatigue is more eminently observed in short sea shipping (Smith *et al.*, 2006; Uğurlu *et al.*, 2012). This study also has considered, for the formation of the working hours program, the working hours of certain tankers working in short sea shipping in Sea of Marmara. While determining the working hours data, the results of an interview performed with 8 masters and watchkeeping officers, working in the tankers navigating between the İzmir Tütünçiftlik region platforms and İstanbul Ambarlı region platforms in the Sea of Marmara, have been also based on (Uğurlu et al., 2009). The periods required by the third mate to perform its duties, of whom the working hours are to be simulated according to the obtained data, have been shown in Table 2.

According to such hours, if the scenario starts with the watchkeeping by third mate, the minimum working hours indication shall happen as shown under Figure 1. Each division represents the 10 minutes part of a day. The meanings of the color codes have been explained below.

Table 2. The periods required for the third mate to perform its duties (Uğurlu *et al.*, 2009)

Duties	Average time
Receive documents from agent before departure	0 h 30 m
Preparing the bridge for unberthing	0 h 30 m
Unberthing maneuver	0 h 40 m
Navigation watch	4 h 10 m
Preparing the documents for agent in arrival port	1 h 00 m
Preparing the bridge for berthing	0 h 30 m
Berthing maneuver	1 h 30 m
Delivery the documents to agent after berthing	0 h 30 m
Passage planning and preparing ISM (International Safety Management) documents (at discharging port)	3 h 00 m
Preparing the ISM documents (at loading port)	1 h 00 m
Port watch (if the cargo operation of the vessel up to 24 hours, two watches in day)	4 h 10 m
Preparing the bridge before anchorage	0 h 30 m
Anchor watch	4 h 10 m

(m: minute, h: hour)

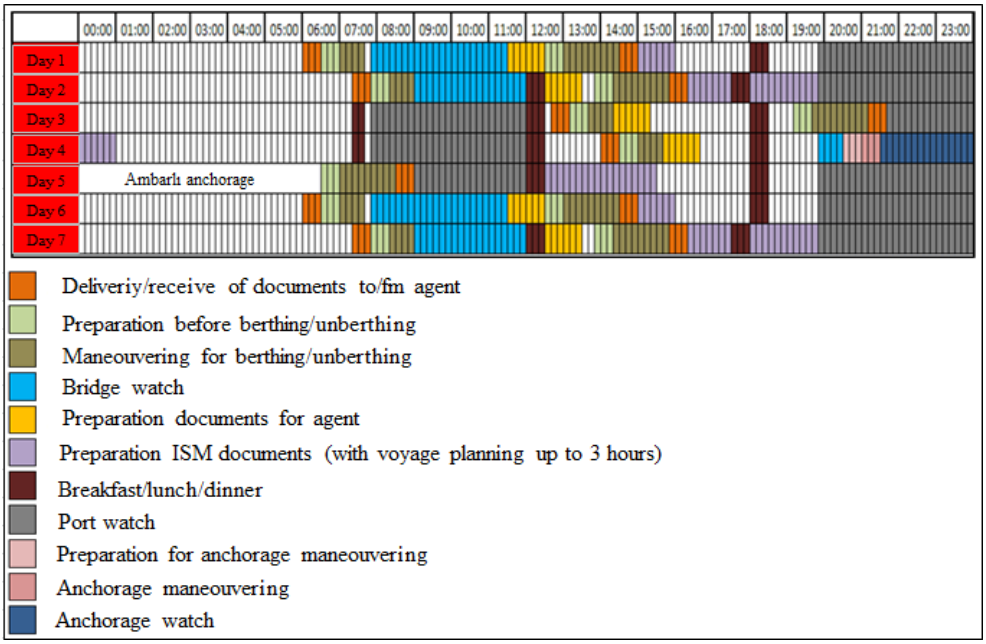


Figure 1. The minimum working hours of 3rd mate

The 3rd officers working on such vessel whom has duties in Figure 1, has approximately 30 minutes for breakfast, lunch or dinner in a day. White areas means the officer's resting times, but the officers use only long resting periods, not short period such as 1 or 2 hours in real life due to next duties. The color codes present the minimum times required for duties. In practical working life, any person may need more time. Therefore, the rest periods can be shorter than expected.

2.2 *Establishment of Navigation Scenarios on the Bridge and Observation Criteria*

The navigation scenarios have been realized in SINDEL MISTRAL® 4000-Full-mission bridge simulator centre. The voyage area in the bridge simulator, according to the program, has been Sea of Marmara and the voyages are round trips from İzmit Bay's Tütünçiftlik refinery area to İstanbul Ambarlı platform area. Considering the vessels in the scenario are tankers, it has been planned the loading in the refinery in İzmit Tütünçiftlik and unloading in a platform in İstanbul Ambarlı. The route distance between Tütünçiftlik and Ambarlı is 56 nm whereas takes 4 hours. The general view of route is given under Figure 2.

İzmit Tütünçiftlik platform has been selected as the loading point and the time lapsing in the loading port has been established as about 20 hours including berthing and departure manoeuvres. A platform in Ambarlı area has been taken as the unloading point and the time lapsing in the unloading point has been established as about 24 hours including berthing and departure manoeuvres. Despite 24 hours pilotage services in the İzmit Tütünçiftlik area, Ambarlı area permit manoeuvring only in daylight and the pilotage services are estimated to be obtained only between the hours 07.00-18.00.

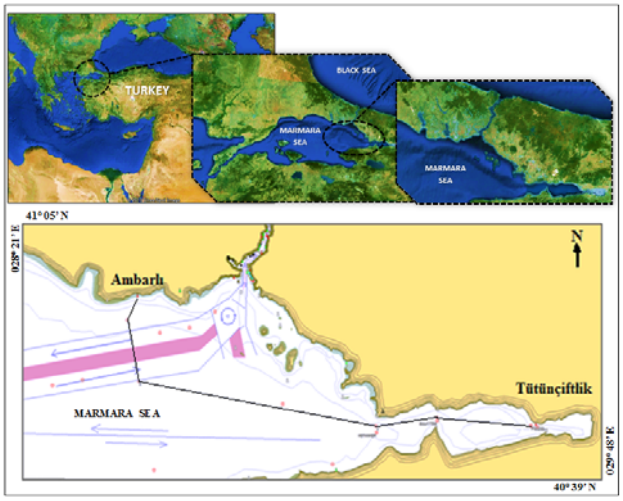
While implementing the scenarios, the operations required to be performed by the watchkeeping officers on the deckhouse have been followed by using control forms. The operations performed by the volunteer, in the role of watchkeeping officer, in certain scenario parts are more significant when compared to the generality of all the operations. These are preparing the vessel to manoeuvre before the departure of the vessel and the period in which the command is delivered to the watchkeeping officer during the navigation.

Under the coverage of 1 week program applied to the volunteers, voyage is performed from Ambarlı to Tütünçiftlik terminal on the 1st day and from Tütünçiftlik terminal to Ambarlı on the 2nd day. During the following course of the program, 6th day scenario, in which the officer is expected to be tired, is made parallel to 1st day and the 7th day scenario in parallel to 2nd day.

The periods in which the watchkeeping officer is monitored/observed are as follows:

- Preparing the bridge before the departure of the vessel
- The internal and external communications during and after the preparations
- The operations required to be performed after the boarding and leaving of pilot
- The passing movements with the vessels during the separation pass
- The passing movements with the vessels on voyage
- The bridge routines to be performed all through the navigation
- The communications to be performed all through the navigation

The navigation assessment lists are formed to ease the monitoring of the bridge operations and recording the data. Also vessel passing lists are formed for assessing the passes by the target vessels. The Table 3 demonstrates the decided control points and related regulations. Abbreviations associated with the legislation and categories meanings given under the table.



ISM : International Safety Management Code
SOLAS : International Convention of Safety of Life at Sea
COLREG : The International Regulations for Preventing Collisions at Sea
GMDSS : Global Maritime Distress and Safety System
VTS : Vessel Traffic Service
N.L. : National Legislation
P.I. : Port Instruction
P.E. : Preparing Equipment
E.C. : External Communication
D.P./R. : Document Preparation/Records
I.C. : Internal Communications
M./N. : Maneuvering/Navigation

Figure 2. The general view of the route

Table 3. Control points and related regulations

Nr.	Control points	Legislation	Categori
1	Did he put the maps in order?	ISM	P.E.
2	Is the map to be used ready?	ISM	P.E.
3	Is the steering gear adjusted to “control console”?	SOLAS	P.E.
4	Are the steering gear pumps ready?	SOLAS	P.E.
5	Is the steering gear tested?	SOLAS	P.E.
6	Does he manually control the steering gear?	SOLAS	P.E.
7	Are the navigation lights open?	COLREG	P.E.
8	Is the Bravo Flag hung?	COLREG	E.C.
9	Is the whistle tested?	COLREG	P.E.
10	Are the wind panel adjustments performed?	ISM	P.E.
11	Is the “meter” adjustment is performed in Echosounder panel?	ISM	P.E.
12	Is the radar on?	COLREG	P.E.
13	Are the radar “day/night” adjustments performed?	COLREG	P.E.
14	Are the VHFs open?	SOLAS	P.E.
15	Is the MF/HF open?	SOLAS	P.E.
16	Did he turn INM-C to “power” ?	SOLAS	P.E.
17	Did he turn INM-C to “login”?	SOLAS	P.E.
18	Did he prepare pilot card?	ISM	D.P./R.
19	Did he complete the form of navigation with pilot?	ISM	D.P./R.
20	Did he complete the control form before departure?	ISM	D.P./R.
21	Did he ask to the engine room the time required for being ready?	ISM	I.C.
22	Did he call the master and asked for confirmation to call the pilot?	ISM	I.C.
23	Did he call the pilot from VHF Ch 12?	N.L./P.I.	E.C.
24	Did he inform the master after contacting with pilot?	ISM	I.C.
25	Did he inform the engine room?	ISM	I.C.
26	Did he inform the deck?	ISM	I.C.
27	Did he hang the hotel flag?	COLREG	E.C.
28	Did he record the time of “Pilot on Board”?	ISM	D.P./R.
29	Did he present the pilot card to the pilot?	ISM	M./N.
30	Did he record the time of “Disembark of Pilot”?	ISM	D.P./R.
31	Did he pulled down the hotel flag?	COLREG	E.C.
32	Did he inform Sector Marmara from Ch 10 while entering the sector?	N.L./VTS	E.C.
33	Did he inform the pilot before arrival from VHF Ch 12? (1 hour)	N.L./P.I.	E.C.
34	Did he inform Sector Marmara from Ch 10 while leaving the sector?	N.L./VTS	E.C.
35	Did he inform the master after contacting the pilot?	ISM	I.C.
36	Did he inform the master before arriving to the pilot station? (30 m)	ISM	I.C.
37	Did he inform the engine room before arriving the pilot station/separation? (30 m)	ISM	I.C.
38	Did he inform Sector Marmara while entering the separation?	N.L./VTS	E.C.
39	Vessel passes	COLREG	M./N.

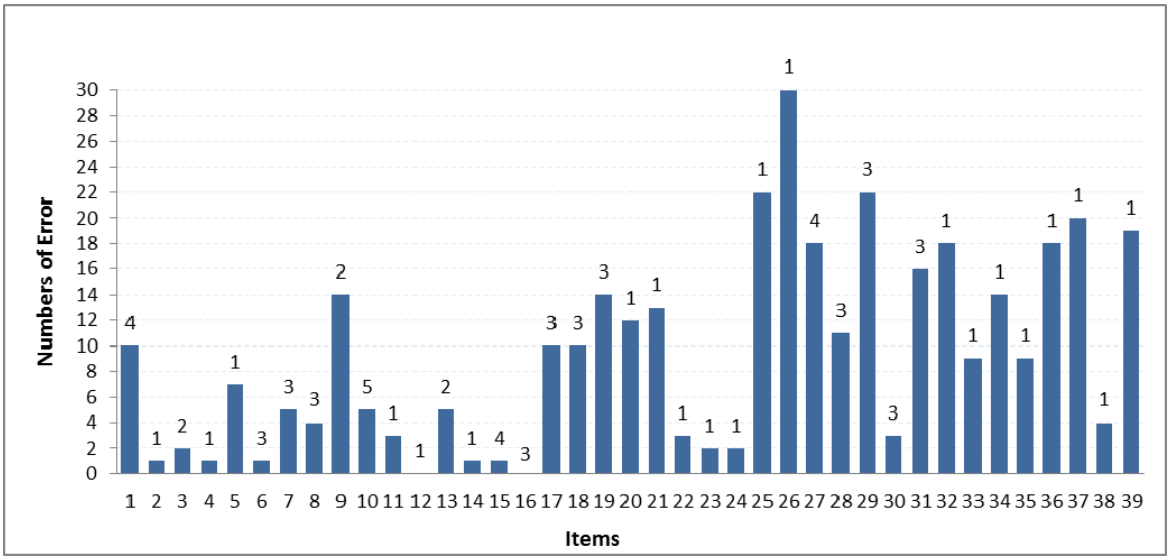


Figure 3. Total errors and degrees of importance

2.3 *Create of Liquid Cargo Handling Scenarios*

The watchkeeping officers, besides their the bridge navigation watches, are observed under their real-time loading and unloading watches. These watches are performed in tanker simulation laboratory and have been named as port watches. The detailed instructions as formed and presented to the watchkeeping officers for the port watches to explain the operations to be performed by them and to prevent the errors that may originate from lack of experience. These watchkeeping officers are informed in line with the STCW convention requirements, tanker compliance and tanker operations certification. The monitoring of the officer during the port operations is performed and recorded automatically by the TRANSAS® LCHS 4000 OIL (V.1.0) LCC TANKER liquid cargo handling program being used in tanker simulator. Thus, the detection of the errors happens to be possible.

3 FINDINGS AND DISCUSSIONS

3.1 *Navigation Scenarios*

The weekly total working and resting hours of the volunteers, during the conducted study, have been in Table 4. The total resting periods of the volunteers, after performing their minimum duties in the Table 2, have varied between 57 hours 30 minutes to 63 hours 30 minutes. The working hours in turn have changed about between 95 hours and 102 hours. When considered the legal regulations given under Table 1, it may be seen that the legal 72 hours working limit is exceeded and the resting hours are left under the 77 hours which is the legal minimum limit. Thus, under the light of aforementioned facts, it may be said that a watchkeeping officer of tanker at short sea shipping is subject to over activity and accordingly under the effect of the fatigue.

The errors performed by the volunteers subject to the working hours and resting periods in Table 4 have been provided under Figure 3 by means of control points and significance priorities. The degree of significance for the navigation safety has been shown on top of the graphic columns that include the error figures of each point. The significance degrees are listed from 1 to 5 (1 as the most important and 5 as the least important).

According to the Figure 3; the volunteers have made errors most frequently, during their navigation duties under the program, under the titles internal and external communications and passing maneuvers with the other vessels. The distribution of the total errors by means of their significance degrees has been provided under Table 5.

Table 4. Weekly total resting and working periods

Volunteers	Total Resting Hours	Total Working Hours
1	61 h 00 m	98 h 50 m
2	61 h 25 m	98 h 10 m
3	61 h 10 m	95 h 30 m
4	63 h 30 m	94 h 40 m
5	63 h 10 m	96 h 30 m
6	57 h 30 m	101 h 50 m
7	57 h 50 m	100 h 00 m

Table 5. Error figures over the significance degrees

Significance Degrees	Total Errors	Percentage (%)
1	208	58,0
2	21	5,8
3	96	26,7
4	29	8,1
5	5	1,4
TOTAL	359	100

The errors seen in Table 5 have occurred, under the one week working program, through the navigation watches of the watchkeeping officers subject to over activity (4 navigation watches for each volunteer); it is a serious situation that 58% of the total error points has been of 1st degree importance group. When considered that the errors under 1st degree importance are navigational anoeuvres and vessel passages, it is understood that a watchkeeping officer subject to over activity, and tired accordingly, may make errors in very important operations that may endanger the safety of the vessel.

When the control points are assessed against the legal regulations, it can be seen that, among the total 359 errors made by the volunteer watchkeeping officers, 58% have been under ISM coverage, 23% under COLREG coverage, 13% under local regulations and 6% under SOLAS coverage (Figure 4).

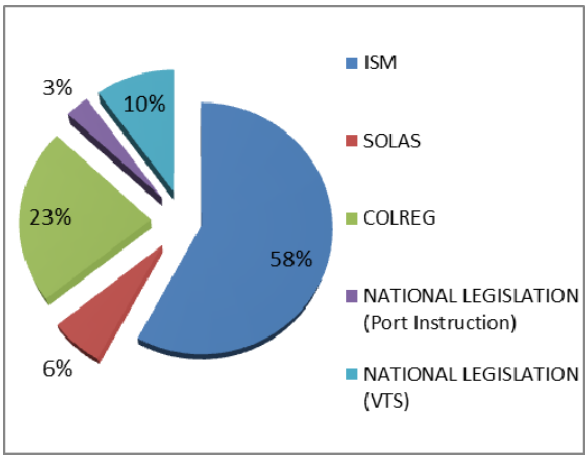


Figure 4. Distribution of the errors over regulations

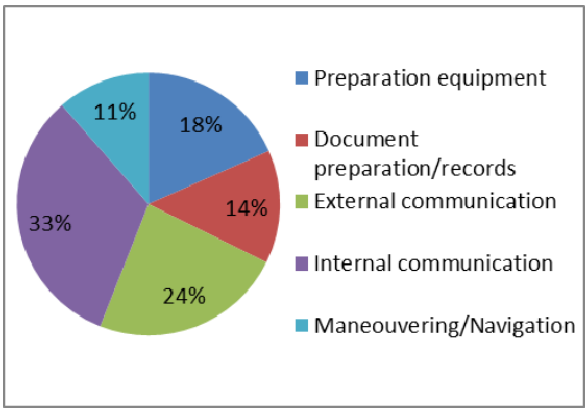


Figure 5. Distribution of Error Classes

When the control points are assessed against the classifications under Table 3, it can be seen that, among the total 359 errors, 33% relates to internal communication, 24% relates to external communication, 18% relates to equipment preparation, 14% relates to document preparation and records, and 11% relates to maneuver and navigation (Figure 5).

3.2 *Liquid Cargo Handling Scenarios*

When the system records related to the load operations performed by the volunteer watchkeeping officers under port watches, as in tanker simulation laboratory, are examined, it may be seen that the volunteers have reduced the valves, stopped the pump before decreasing the speed of the cargo pump, opened mistaken valves, forgotten some valves open after the operation, closed the load entry valves while the terminal continues to function, closed the entry valve of the tank while the ballast pump is in operation during the ballast intake, opened mistaken manifolds, functioned the mistaken pumps, performed unnecessary valve opening/closing transactions, performed unloading with double pumps contrary to the operational instructions, performed ballast operations without a command, tried to close the already closed valves, re-instructed without being aware of the already functioning terminal, started the cargo pump before the discharging line is ready and not complied with the criteria related to the order of operations given under operational instructions.

Valve reduction causes the increase of pressure in the line and damage on the same. It is a known error also general in practice. It may also be named as a breach since performed against the rules. Stopping the pump without decreasing the pump speed may damage the respective pump. The functioning of the discharging pumps of the vessel before the lines are ready will mean damage on the pump. A valve not being opened in the line means the line is not ready. Forgetting the valves open after the operation then shall result with uncertainty about the position (ready or not) of the line in a subsequent operation. Opening the mistaken manifold valve or establishing a mistaken line connection is a serious situation which may result with discharging the liquid loads to an environment other than the line or to the sea. In the same manner, closing the respective loading valves while the terminal pumps continue to load into the vessel may cause explosion of the manifold or line as well as damage on the terminal pump and environmental pollution.

4 CONCLUSIONS

The fast transport of the products from the producer to the consumer have gained importance together with the technological advances. For the fast transport of commodities, fast loading, fast unloading and port durations have been reduced and the navigation speeds of the vessels have increased. Thus, the working periods and intensity of the crew have increased in parallel with the increased maritime operations. Many actions have been taken together with such increased working load as well as many accepted rules, however, this could not prevent the human errors to play an important role in the occurred accidents. Establishing the effects of the fatigue on the risk of errors by the seafarers will be important by means of prevention of marine accidents.

It is a known fact that the intensity of the operations and works in the tankers at short sea shipping cause the increase of the working loads of the watchkeeping officers assigned in such vessels. This study has established the errors realized by watchkeeping officers under fatigue by making use of bridge and tanker simulators. Considering the results of this study, it is thought a linear relationship exists between the fatigue and error making tendency. Compliance with the resting periods provided to the watchkeeping officers by the international and national regulations has an utmost importance. Not complying such periods or dividing such periods into parts shall mean not providing the required resting periods to the officers. Thus, it requires uninterrupted resting periods. It can be said that working in breach

of rules increase the tendency of the officer to make error.

Working time regulations must be complied with to the maximum. To comply with the limitations of working hours, it is necessary to increase the number of officers responsible for operations such vessels.

REFERENCES

AIBF, 2007. Accident Investigation Board of Finland, Annual Report 2006, Helsinki, Finland (http://www.emsa.europa.eu/annual-reports.html)

Arslan, Ö., and Er, İ. D. (2007). Effects of Fatigue on Navigation Officers and SWOT Analyze for Reducing Fatigue Related Human Errors on Board. International Journal on Marine Navigation and Safety of Sea Transportation, 1(3), 345-349.

BEAmer, 2004. Rapport d'activité 2003 Second semestre & 2004 Année (in French) http://www.beamer-france.org/BanqueDocument/pdf_18.pdf

BEAmer, 2005. Rapport d'activité 2005 (in French) http://www.beamer-france.org/BanqueDocument/pdf_20.pdf

BEAmer, 2006. Rapport d'activité 2006 (in French) http://www.beamer-france.org/BanqueDocument/pdf_33.pdf

BEAmer, 2007. Rapport d'activité 2007 (in French) http://www.beamer-france.org/BanqueDocument/pdf_123.pdf

BEAmer, 2008. Rapport d'activité 2008 (in French) http://www.beamer-france.org/BanqueDocument/pdf_205.pdf

BEAmer, 2009. Rapport d'activité 2009 (in French) http://www.beamer-france.org/BanqueDocument/pdf_214.pdf

BEAmer, 2010. Rapport d'activité 2010 (in French) http://www.beamer-france.org/BanqueDocument/pdf_270.pdf

BEAmer, 2011. Rapport d'activité 2011 (in French) http://www.beamer-france.org/BanqueDocument/pdf_301.pdf

BP, 2010. Deepwater Horizon Accident Investigation Report http://www.bp.com/liveassets/bp_internet/globalbp/globalbp_uk_english/incident_response/STAGING/local_assets/downloads_pdfs/Deepwater_Horizon_Accident_Investigation_Report.pdf

BSU, 2011. 2011 Annual Report http://www.bsu-bund.de/SharedDocs/pdf/EN/ Annual_Statistics/annual_statistics_2011.pdf?__ blob=publicationFile

Chauvin, C. (2011). Human Factors and Maritime Safety. Journal of Navigation, 64(04), 625-632

CIAIM, 2010. Annual Report 2009 http://www.emsa.europa.eu/annual-reports.html

CIAIM, 2011. Annual Report 2010 http://www.emsa.europa.eu/annual-reports.html

Çakmakçı, M., 2001. Medical Errors: Definitions and Importance of the Topic, ANKEM Journal, 15, 3, 247-249 (in Turkish)

DIMA, 2009. Summary of Marine Accidents and Incidents in 2009 http://www.emsa.europa.eu/annual-reports.html

DMA, 2008. Marine Accidents 2007, Copenhagen, Denmark http://www.dma.dk/SiteCollectionDocuments/Publikationer/Maritime-accidents/Accidents-at-Sea-2007.pdf

DMA, 2009. Marine Accidents 2009, Copenhagen, Denmark http://www.dma.dk/SiteCollectionDocuments/Publikationer/Maritime-accidents/Accidents%20at%20Sea%202009.pdf

Ece, J.N., 2008. Maritime Accidents in History and Countermeasures (in Turkish) http://www.denizhaber.com/index.php?sayfa=yazar&id=11&yazi_id=100278

European Union, 1999. Council Directive 1999/63/EC of 21 June 1999 concerning the Agreement on the organisation of working time of seafarers concluded by the European Community Shipowners' Association (ECSA) and the Federation of Transport Workers' Unions in the European Union (FST), Official Journal of the European Union, L 167/33-37

European Union, 2003. Directive 2003/88/EC of The European Parliament and of The Council of 4 November 2003 concerning certain aspects of the organisation of working time, Official Journal of the European Union, L 299/9-18

Greenpeace, 2010. BP Deepwater Oil Disaster (in Turkish) http://www.greenpeace.org/turkey/Global/turkey/report/2010/5/bp-deepwater-petrol-felaketi.pdf

Hoch, M., 2010. New Estimate Puts Gulf Oil Leak at 205 Million Gallons http://www.pbs.org/newshour/rundown/ 2010/08/new-estimate-puts-oil-leak-at-49-million-barrels.html

IMO, 2001. Guidance on Fatigue Mitigation and Management MSC/Circ.1014, London, http://www.imo.org/OurWork/HumanElement/VisionPrinciplesGoals/Documents/1014.pdf

IMO, 2004. Resolution A.947(23), Human Element Vision, Principles and Goals for The Organization http://www.imo.org/blast/blastData.asp?doc_id=12252&filename=A%20947(23).pdf

IMO, 2011. International Convention on Standards of Training, Certification and Watchkeeping for Seafarers STCW Including 2010 Manila Amendments, IMO Publications, London.

MAIB, 2012. Annual Report 2011, Southampton, UK http://www.maib.gov.uk/cms_resources.cfm?file=/MAIB_Annual_Report_2011.pdf

MCIB, 2011. Annual Report 2010 http://www.mcib.ie/_domain/media/file//PDF/MCIB%202010%20Annual%20Report%20(English).pdf

Official Journal, 2002. Seafarers Regulation, Turkey Prime Minister Publications (No. 24832).

Reason, J., 1990. Human Error, Cambridge University Press, UK, 302 s

Rothblum, A.M., 2000. Human Error and Marine Safety, In Proceeding of the Maritime Human Factors Conference 1-10, College Park, Maryland. http://www.bowles-langley.com/wp-content/files_mf/humanerrorandmarinesafety26.pdf

Shappell, S.A. and Wiegmann, D.A., 2000. The Human Factors Analysis and Classification System-HFACS, 19 s, U.S. Department of Transportation, Office of Aviation Medicine, Report No DOT/FAA/AM-00/7, Washington D.C.

Shea I.P. and Grady N., (1998). Shipboard Organisational Culture in the Merchant Marine Industry, Proceedings of the Safe Navigation Beyond, Gdynia.

SMA, 2007. Notice of the Swedish Maritime Administration, No. 1 2007, Summary of Reported Marine Casualties, Near Accidents and Accidents to Persons – Swedish Merchant and Fishing Vessels 2006 http://www.emsa.europa.eu/annual-reports.html

Smith, A., Allen, P. and Wadsworth, E., 2006. Seafarers' Fatigue: the Cardiff Research Programme, Centre for Occupational and Health Psychology Cardiff University, Cardiff, 87 s

Uğurlu, Ö., Köse, E., Başar, E. and Yüksekyıldız, E., 2009. Interview Study on Working Hours of Deck Officers on a Product Tanker.

Uğurlu, Ö., Köse, E., Başar, E., Yüksekyıldız, E. and Yıldırım, U., 2012. Investigation of Working Hours of Watchkeeping Officers on Short Sea Shipping: A Case Study in an Oil Tanker. The 2012 International Association of Maritime Economists Conference, September 2012, Taipei