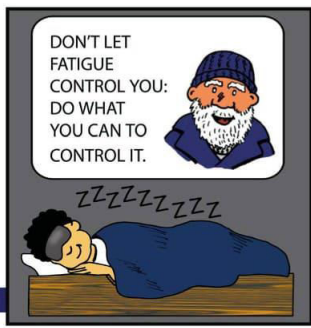
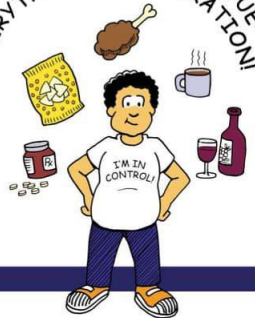


THERE ARE MANY FACTORS THAT CAN DISRUPT OUR SLEEP, AND LEAD TO FATIGUE.

MANY ARE BEYOND OUR CONTROL. HOWEVER...



TAKE CONTROL OF FATIGUE. EVERYTHING IN MODERATION!



Take Control Of Fatigue



ΠΤΥΧΙΑΚΗ ΕΡΓΑΣΙΑ
ΚΑΪΟΓΛΟΥ ΜΙΧΑΕΛΑ
ΑΕΝ ΜΑΚΕΔΟΝΙΑΣ
ΣΧΟΛΗ ΠΛΟΙΑΡΧΩΝ

ANALYZE PROBLEMS ON BOARD (FATIGUE, WELLNESS) AND SUGGEST APPROPRIATE SOLUTIONS

**ΑΚΑΔΗΜΙΑ ΕΜΠΟΡΙΚΟΥ ΝΑΥΤΙΚΟΥ
Α.Ε.Ν ΜΑΚΕΔΟΝΙΑΣ**

ΠΤΥΧΙΑΚΗ ΕΡΓΑΣΙΑ

ΕΠΙΒΛΕΠΟΥΣΑ ΚΑΘΗΓΗΤΡΙΑ: ΠΑΝΑΓΟΠΟΥΛΟΥ ΜΑΡΙΑ

ΘΕΜΑ

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Α.Γ.Μ: 4524**

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Ο ΔΙΕΥΘΥΝΤΗΣ ΣΧΟΛΗΣ : ΤΣΟΥΛΗΣ ΝΙΚΟΛΑΟΣ

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Abstract

While growing up people wanted to become like people or professions that inspired them. Future ambitions differ from person to person as they choose different career paths to follow. While most people choose to become doctors or lawyers, I decided to become a seafarer. I chose that career path because from when I was young, I always spoke about everything related to the sea, ships, oceans, ports and of course not to lose the chance to travel around the world. The word “seafaring” has a much broader spectrum beyond the imagination of land dwellers enjoying the fruits of it. As some people think, this profession is just a form of adventure which gives free travel at no cost and hefty salary to the seafarer. However, this is far from reality. Being a seafarer is hard and dangerous. A seafarer has to be tough to survive, must have discipline, dedication, mental and physical health and will for evolution. Seafaring demands sacrifices like social distancing, leaving home for more than 4 months and working on extreme weather conditions. In this dissertation, I am about to analyze common problems that seafarers face nowadays, called “Fatigue” and “Wellness”. Furthermore, I am going to refer to how COVID-19 has affect living conditions on board and what measures seafarers take while the vessel stays at port. To sum up, I will describe the measures seafarers can manage fatigue, improve their wellbeing and protect themselves against COVID-19.

Introduction

Seafarers' fatigue and wellness is a major issue in the shipping industry, as it has a direct impact on crews' efficiency and furthermore affects ship's functionality. It is a fundamental labor law, working in environments in which all the appropriate safety and security measures are taken into account. Both employees and employers are obliged not to neglect issues bear upon safety and hygiene in the working environment.

According to surveys, being a seafarer is one out of 10 most dangerous occupations around the world, notwithstanding that people on land assume that it is an easy profession accompanied with uniforms and chevrons. We can agree that many obstacles exist in maritime profession and certainly it is not suitable for weak people or someone who cannot work in such a difficult and harsh environment despite of the good financial earnings.

In relation to W.H.O., 1 out of 4 people worldwide has suffered from mental disorders at least one in a lifetime, which proves us that those cases are related to psychological issues in any working environment. For their part, shipping companies, as ISWAN (International Seafarers' Welfare and Assistance Network) points out, should support the mental health of their seafarers as it is inextricably linked to their physical health.

Working errors connected to fatigue among the crew of a merchant vessel, should be analyzed when the concept of the International Maritime Organization (IMO) is completely understood. The IMO is a specific administration of the United Nations specialized on safety and security of shipping.

Unit 1 - Fatigue

1.1 The definition of the word “fatigue”

Briefly, fatigue is commonly known as a term that describes weakness and a range of disorders from physical to mental. Fatigue is a consequence after a heavy workload or lack of social interaction and isolation. Fatigue is also known as exhaustion and tiredness.

Another explanation of fatigue, is a state of physical and mental malfunction, a consequence of factors such as loss of rest, constant vigilance and extensive physical, mental and emotional exercise, factors that lead to a lack of readiness and so the ability to proper function and management of the vessel.

According to International Maritime Organization (IMO) MSC/Circ.813/MEPC/Circ.330, List of Human Element Common terms, fatigue is defined as “A reduction in physical and/or mental capability as the result of physical, mental or emotional exertion which may impair nearly all physical abilities including: strength, speed, reaction time, coordination, decision making, or balance”.

Fatigue has consequences for everyone, regardless of ability, knowledge, education and experience. Even if there was such an argument, that people with great experience be less affected in cases of long working hours would not be right. The reason is that perennial experience comes along with age, which makes the person even more vulnerable to fatigue. The danger derives mainly from lack of proper judgement for how much fatigued they may be.

1.2 Types of fatigue

Fatigue sometimes affects how we think or how we react in our daily routine or even in emergencies. It also affects our body, makes us weak, vulnerable to diseases by lowering our immune system. According to these, fatigue is categorized into two types, mental health and physical health and sometimes a combination of those two, which is very rare. That means that someone could be mentally and physically ill but, that happens one in a million.

1.2.1 Mental fatigue

Mental fatigue is a temporary inability to maintain optimal cognitive performance. It includes our emotional and psychological wellbeing which concerns our feelings and thoughts. It helps us handle stress related to work and make clear choices. Having a clear mind while working, helps taking the right actions either on a dangerous situation or when filling a form. Mental health could be affected by our childhood and through life experiences growing up or biological factors such as our genes. However, it can be dangerous because, having mental fatigue while performing tasks that require constant concentration like operation, if the officer on watch (OOW) is somnolent / tired may experience sleep. The perception of mental fatigue is believed to be modulated by the brain's reticular activating system (RAS).

1.2.2 Physical fatigue

Physical fatigue or muscle fatigue is strongly linked with mental health. That happens because when we take care of our physical health, we automatically improve our mental health. Physical fatigue is the inability of muscles to maintain their physical performance. It worsens with severe intense exercise, unhealthy habits, smoking and unbalanced diet. However, muscle inability/ pain does not always provide physical fatigue but just a simple muscle pain caused by intense exercise or a sudden move.

1.3 Symptoms of fatigue

Fatigue can cause a range of mental, physical or emotional symptoms; however, those symptoms differ from person to person.

1. Chronic tiredness
2. Headache
3. Dizziness
4. Muscle pain / weakness
5. Slowed responses
6. Nonclear decision-making and judgement
7. Irritability
8. Appetite loss
9. Reduced immune system
10. Blurry vision
11. Memory problems
12. Lack of concentration
13. Low motivation.

1.4 Factors that can cause fatigue

Fatigue is more likely to affect seafarers because stress, anxiety and depression exist almost to everyone that suffers from that kind of disorder. However, there are some other factors that seafarers often face that will worsen this situation.

1. Lack of communication with family and friends / Social interaction
2. Isolation
3. Safety / security on board
4. Non-payment wages
5. Absence of PPE (Personal Protective Equipment)
6. Repatriation delays / cancelation
7. Poor food quality
8. Use of alcohol (on daily basis)
9. Use of harmful substances
10. Overconsumption of caffeine
11. Insomnia
12. Crew conflicts
13. Heavy workload
14. Stress / anxiety

1.4.1 Specific factors that may lead to fatigue

Fatigue at sea is more likely to happen due to 5 specific factors. These factors are:

- Management factors like overtimes, breaks, rules and regulations, working-resting hours, long stand-by followed by canals, fairways transits etc. that require maneuvers of the vessel.
- Environmental factors like swell, humidity, excessive noise levels that can increase stress. Long-term exposure may even cause harm to a person's health.
For instance, travelling from high to low temperatures, like from United Arab Emirates (with average temperature ~ 38°C) to Northern China (with average temperature ~ 10°C) and vice versa.
- Sleep factors. A large proportion of seafarers refer to not sleeping well and to having rest continuously interrupted. This phenomenon, similar to the "jet lag" and it affects seafarers while crossing several zone times.
- Crew-specific factors include:
 1. Sleep and rest,
 2. Quality, quantity and duration of sleep,
 3. Sleep disorders or disturbances,
 4. Rest Breaks,
 5. Fear,

6. Monotony and boredom,
 7. Diet,
 8. Illness,
 9. Skill, knowledge and training as it relates to the job,
 10. Personal problems, Interpersonal relationships
- Ship-specific factors. Some ship design features such as automation, equipment reliability affect work load. Some of them give a chance to crew for an extra sleeping hour and some others affect the level of the physical stress (i.e. noise, vibration etc.). Some detailed ship-specific factors are:
 1. Ship design
 2. Equipment reliability
 3. Level of automation
 4. Age of vessel
 5. Maintenance
 6. Comfortable accommodation spaces
 7. Balance of the ship / Ship motion (A ship's pitching and rolling motions would need 15-20% extra effort to maintain the balance. Maintaining balance requires extra energy, which can then cause fatigue).

1.5 Effects of fatigue

Previously we talked about the causes / factors that will make us feel fatigued. Now we will talk about the effects fatigue has on us and what accidents will follow if officers or ratings are fatigued and need to carry out a serious task.

Fatigue affects mind and body. That means, if we are fatigued, we won't be able to take the right decision in an emergency or perform a task based on physical strength.

The following tables demonstrate possible effects of fatigue by listing the performance impairments and the symptoms associated with them and may be used to identify an individual's level of alertness.

| COGNITIVE | |
|-------------------------------|---|
| PERFORMANCE IMPAIRMENT | SIGNS / SYMPTOMS |
| | <ol style="list-style-type: none"> 1. Unable to organize a series of activities 2. Preoccupied with a single task |

| | |
|------------------------------------|--|
| Inability to concentrate | <ol style="list-style-type: none"> 3. Focuses on a trivial problem, neglecting more important ones 4. Reverts to old but ineffective habits 5. Less vigilant than usual 6. Decline in ability to solve complex problems 7. Lapses of attention 8. Difficulty in multitasking |
| Diminished decision-making ability | <ol style="list-style-type: none"> 1. Misjudges distance, speed, time etc. 2. Fails to appreciate the gravity of the situation 3. Overlooks items that should be included 4. Chooses risky options 5. Greater indecisiveness |
| Poor memory | <ol style="list-style-type: none"> 1. Fails to remember the sequence of task or task elements 2. Difficulty remembering events or procedures 3. Forgets to complete a task or part of a task 4. Memory lapses |
| Slowing of cognitive processes | <ol style="list-style-type: none"> 1. Responds slowly (if at all) to normal, abnormal or emergency situations |

| PHYSICAL | |
|-------------------------------|--|
| PERFORMANCE IMPAIRMENT | SIGNS / SYMPTOMS |
| Involuntary need to sleep | <ol style="list-style-type: none"> 1. Slow eyelid closures 2. Droopy eyelids 3. Itchy eye 4. Nodding off 5. Inability to stay awake |
| | <ol style="list-style-type: none"> 1. Affected speech, e.g. it may |

| | |
|--|--|
| <p>Loss of control of bodily Movements</p> | <p>be slurred, slowed or garbled, or hard to find the right words</p> <ol style="list-style-type: none"> 2. Feeling heaviness in the arms and legs 3. Clumsiness, such as increased frequency of dropping objects like tools or parts 4. Difficulty with hand-eye coordination skills (such as switch selection) 5. Tremors |
| <p>Health Issues</p> | <ol style="list-style-type: none"> 1. Headaches 2. Giddiness 3. Rapid breathing 4. Digestion problems 5. Leg pains or cramps 6. Insomnia 7. Sudden sweating fits 8. Heart palpitations / irregular heart beats 9. Loss of appetite (and sometimes an increase in unhealthy eating habits) |

| <p align="center">BEHAVIOURAL</p> | |
|---|---|
| <p align="center">PERFORMANCE IMPAIRMENT</p> | <p align="center">SIGNS/SYMPTOMS</p> |
| <p>Mood change</p> | <ol style="list-style-type: none"> 1. Quieter, less talkative than usual 2. Unusually irritable 3. Decreased tolerance and anti-social behavior 4. Depression |
| | <ol style="list-style-type: none"> 1. Fails to anticipate danger 2. Fails to observe and obey warning signs 3. Seems unaware of own poor performance |

| | |
|-----------------|---|
| Attitude change | <ol style="list-style-type: none"> 4. More willing to take risks 5. Ignores normal checks and procedures 6. Displays a "don't care" attitude 7. Less desire to socialize 8. Increasing omissions and carelessness 9. Low motivation |
|-----------------|---|

**Table 1: Effects of fatigue from IMO MSC.1/Circ1598 Annex pages 16-17.*

Unit 2 - Analyzing some of the factors that may lead to fatigue

2.1 Maritime Labour Convention 2006 (MLC)

The Maritime Labour Convention (MLC) was established in 2006 as the 4th pillar of International Maritime Law and embodies "all up-to-date standards of existing International Maritime Labour Conventions and Recommendations, as well as the fundamental principles to be found in other international labour Conventions". The other pillars are the SOLAS, STCW and MARPOL.

2.2 Sleep & Working/ Resting hours according to MLC

The sum of the time a sailor spends at work is perhaps the most important factor of fatigue and exhaustion. In the various protective measures adopted by IMO, concerning sailors' working hours in which there is an indicative frame of watches as well as working hours for maritime workers. It is determined that working hours refer to the hours that the sailor is obliged to work on behalf of the ship, while on the contrary, rest hours refer to the breaks and hours at which people rest. Resting hours play a significant role because, participants working on a 6-on, 6-off watch system tend to be sleepier/more exhausted than those who work on a 4-on, 8-off watch system.

More specifically, according to the international convention, the working / resting hours on board, must comply with the following:

- 1) The common working hours must be 8 hours daily, with a resting day per week
- 2) The maximum working hours should not exceed 14 hours per day and 72 hours per week
- 3) The minimum resting hours should not be less than 10 hours per day and 77 hours per week.

- 4) The required resting hours can be divided into two parts, one of which will last at least 6 hours, whereas the space between consecutive resting periods, shouldn't exceed 14 hours.

Specific attention should be paid to the fact that the Master may, by exception, request an increase in working hours by seafarers, when issues threatening the safety of the ship and its crew or when assistance is provided to adjacent ships. At the end of the emergency situation, he must ensure that sailors will get enough rest.

Deck and engineer officers, along with apprentices and cadets may be required to work in excess of the above-mentioned hours, all of which shall be considered as overtime. For each hour of overtime work, the officer would be entitled to compensatory hours of rest and overtime remuneration.

Proper rest and sleep, however, are not merely matters of personal comfort, they are vital to a person's physical and mental wellness. Moreover, those without proper sleep are likely to make more mistakes and suffer from more accidents. This is particularly true on vessels working abroad, where crew are engaged in both physically and mentally demanding work, at times in dangerous situations and having to fulfill work rosters that are tight and demanding for all on board. A cup of coffee cannot cure fatigue.



“Seafarers spend months on end at sea, facing some of the toughest conditions of any workforce – isolation, cramped living quarters, noise, heat, storms – sometimes they’re not even able to stomach the food on board.”

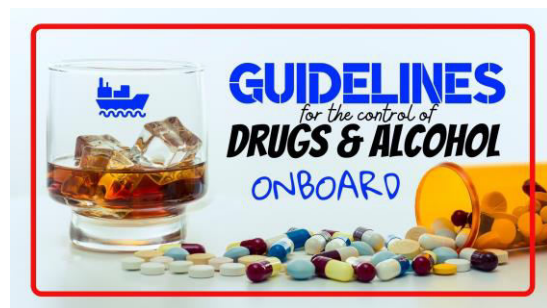
- Sailors’ Society CEO Stuart Rivers

2.3 Noise and motion

It is well recognized that exposure to noise may cause adverse health effects, such as sleep disturbance. Motion and noise appear as two factors in particular which characterize the seafarers' experience. Several studies have shown that obtaining adequate sleep may be a challenge for seafarers, and accidents at sea have been related to fatigue or sleepiness, which is closely linked to insufficient sleep. Noise is one of the main physical stressors on board vessels and questionnaire surveys among seafarers have indicated noise as an important cause for sleep disturbance at sea.

2.4 Alcohol / Drugs consumption

Alcohol has always played a crucial role in all human culture throughout history, in defining the nature of social events, describing cultural values and systems while shaping behavioral norms and expectations regarding alcohol use. However, alcohol consumption is linked to a number of a physical, psychological and social problems like:



- 1) Alcohol related diseases (including high blood pressure, heart disease, stroke, liver disease, and digestive problems)
- 2) Mental health problems (including depression and anxiety)
- 3) Learning and memory problems
- 4) Social problems (including loss of productivity, family issues, violence and accidents)

The symptoms and effects of alcohol, are widely known throughout the marine industry. The signs of drug abuse are not so well known, nor is there a widespread appreciation of the effects of various drugs on work performance, attitude and behavior. Severity of alcohol use disorder is defined as:

- Mild: The presence of two to three symptoms
- Moderate: The presence of four to five symptoms
- Severe: The presence of six or more symptoms

These symptoms are:

- 1) Drinking alone and in secrecy
- 2) Loss of interest in activities that were once enjoyable
- 3) Alcohol desire
- 4) Making drinking a priority over responsibilities, such as employment and family

- 5) Alcohol withdrawal symptoms (sweating, anxiety, etc.)
- 6) Emotional instability and irritability
- 7) Feelings of guilt associated with drinking
- 8) Having a drink first thing in the morning
- 9) Continuing to drink, despite health and financial problems and working environment
- 10) Inability to stop or control the amount of alcohol that's consumed

2.5 Stress / Anxiety

Stress is a phenomenon known and inherent in humanity, or rather a function, which has end up a scourge of today's human society. Stress is not a condition but a primordial mechanism, which exists from human birth. It is a mechanism of survival, reaction to fear and threat. Think about the reaction of a prehistoric man to the threat of one oversized predator. His first thoughts would be the perception of the danger to his life and the search for a way of survival, so he would think of running and hiding or fighting. The organization so it recognizes this intention, increases the heart rate and sends blood (oxygen) to the organs which are necessary for the process. These organs are the extremities for fighting or fleeing and the brain to draw up a strategic plan. So since the threat was clear, its usefulness is undeniable. The problem lies today. The human species has evolved to the point where it is not threatened more than natural predators in his daily life, but the stress did not develop in parallel with it. Since humanity has solved the problem of its place in the food chain, literally going out from her, the threats against her changed character. So what is modern man threatened with? The primary factors of fear and confusion are:

1. The threat of prosperity and well-being of the individual
2. The feeling of inability to cope
3. The fear for his life due to the actions of his fellow human beings
4. A series of irrational phobias
5. The unknown

The reasons for stress appearance are specialized categories of the above:

1. Personal problems (family, alienation, loneliness, psychological disorders)
2. Insufficient and fragmented sleep
3. Physical and mental exhaustion
4. Disruption of interpersonal relationships
5. The feeling of constant control at work

All of these factors can have a serious impact on a seafarer's ability to take the necessary rest, resulting in natural fatigue. For example, its nature profession makes it difficult and often tests the average seafarer's family.

2.6 Food and wellness

Food plays a crucial role in our lives and apart from sustaining our existence on a daily basis, it can also be a source of joy, creativity, social gatherings and comfort. In the best of times, while working at sea, seafarers do not have the option to eat out or choose their favorite takeaway like people ashore can. Some aspects surrounding food on board had recently made headlines in maritime related news due to their severity. There have been several cases, where crews were reportedly not provided with basic food and drink while on board, being short of food, or running out of food altogether.

All aspects of life on board are planned and tightly scheduled for all seafarers, with set mealtimes for all the crew working on board. One important aspect of food, relates to the global nature of the industry which inevitably leads to diverse dietary habits in multi-ethnic crews. For Instance, one cook from India noted how he had to accommodate the different nationalities on board and ‘make everyone happy’, so every 15 days he rotated the menu to diversify seafarers’ menu, cooking ‘Indian, Filipino and European’ dishes to appease different tastes on board. On another ship, a cook from the Philippines always planned the menus for the different nationalities on board by cooking individual dishes almost at every meal to cater for seafarers’ personal taste.

Seafarers have little or no control over the portion of food on board, and it is even more evident in long voyages where the ship’s provisions can run very low if the unexpected happens, like long-lasting anchorage, or if there was no proper planning or budgeting for the voyage.

An aspect of work relating to food worth mentioning relates to seafarers’ work schedules and shifts on board which often leads to irregular mealtimes. While mealtimes are generally scheduled around the same time every day, seafarers’ shifts might not coincide with these mealtimes. This normally means seafarers need to reheat the food and often eat by themselves, or in cases where there was no food left aside for them, they will have to find something else to eat, and in some cases will be required to cook for themselves.

Healthy lifestyle choices, such as fitness and a healthy diet, are natural to reduce fatigue and improve alertness and performance as they shape and maintain an organism of higher endurance. Instead, unhealthy lifestyle choices can adversely affect sleep and therefore contribute to fatigue. An unbalanced diet, deprived of fresh fruits and vegetables, can affect negatively affect the health of the sailor and contribute to fatigue.

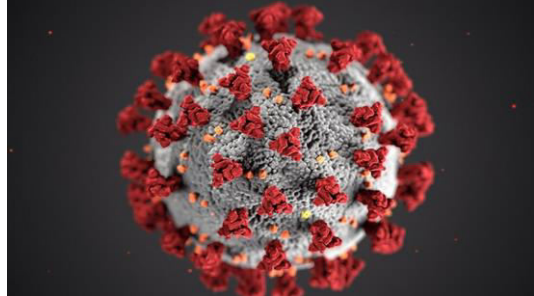
Additional factors not taken into account include the amount eaten by seafarers on a daily basis and seafarers’ physical activity and energy expenditure based on the different roles

and departments they occupy. Decisions on food pricing and composition could benefit from empirical evidence based on scientific research.

Unit 3 - The COVID-19 era in Maritime

3.1 COVID-19 history

COVID-19 is an abbreviation of Coronavirus disease. A virus that has begun to infect people on December 2019 as an epidemic in Wuhan, P.R.C. and has rapidly spread all over the world, causing a pandemic phenomenon until now. The first countries that had casualties were U.S.A. and Italy. At first Greece hadn't faced any deaths, but now counts 21.185 deaths. The W.H.O. (World Health Organization) and the N.P.H.O. (National Public Health Organization) often publish reviews about the progress of the disease and measures about how people can protect themselves and their loved ones against COVID-19.



Picture 1 - Coronavirus

3.2 COVID-19 symptoms

Coronavirus has some common symptoms with the flu. The symptoms are:

- 1) Fever
- 2) Dry cough / Sore throat
- 3) Fatigue
- 4) Headache
- 5) Conjunctivitis (a.k.a. red eyes)
- 6) Loss of appetite

However, there are some symptoms on coronavirus disease that do not exist on the common flu. These are:

- 1) Loss of taste / smell
- 2) Muscle / joint pain
- 3) Nausea / Vomiting
- 4) Diarrhea
- 5) Dizziness
- 6) Confusion
- 7) Depression / Anxiety

The 80% of those who develop COVID-19 symptoms recover from the disease without needing hospital treatment. About 15% of them require oxygen and 5% need intensive care. Disorders that may lead to death are:

- 1) Respiratory failure
- 2) ARDS (Acute Respiratory Distress Syndrome)
- 3) Sepsis / Septic shock
- 4) Thromboembolism
- 5) Multiorgan failure (including injury of the heart, liver or kidneys)

3.3 Coronavirus vs Seafarers

The epidemic that COVID-19 has caused, has been a global scourge. Apart from health problems, its high transmissibility has caused huge obstacles in industries and transportation.



Being a seafarer, is undoubtedly a profession that by nature assumes from the sailor mental strength, endurance and patience. The long-lasting stay in an isolated environment away from the family, social environment and home, are conditions with which seafarers have reconciled.

Picture 2 - Stranded seafarers

However, with the difficulties in crew changes due to restrictions on transnational travel and the ban on crew shore leave permit at ports for safety reasons, due to covid-19, sailors are faced with new challenges, which further harm their mental health.

3.4 Filistos ASCOT research on seafarers' mental health

Filistos ASCOT present a study about seafarers' mental health on February 2020 to May 2020. On the following table there is the difference between this 4-month period for 2019 and 2020.

| Issues | 2019 | 2020 |
|---------------------|-------------|-------------|
| Anxiety | 17 | 64 |
| Stress | 25 | 54 |
| Fatigue | 27 | 52 |
| Depression | 12 | 47 |
| Job Dissatisfaction | 6 | 39 |

| | | |
|-------------------|----|----|
| Sleep problems | 20 | 32 |
| Suicidal thoughts | 12 | 22 |
| Paranoid Ideation | 7 | 13 |

**Table from isalos.net about covid-19 and the consequences on seafarers' mental condition.*

The 3 most important points of the table are:

- 1) The increase of suicidal thoughts from 12% to 22%, a number that shows almost doubling the number of people that have even thought of ending their lives at least once.
- 2) The occurrence of sleep problems due to anxiety, which also almost doubled from 7% to 13%.
- 3) The most crucial point is job dissatisfaction, that is the tendency of the sailor to want to change profession. In 2019 this percentage was at 6%, while in the same period in 2020, this percentage rapidly increased to 39%.

The difference between officers and crew was not significant. This means that even high-ranking officers will seriously consider whether to board a ship again. In no case does it mean that all of them will leave the occupation of sailor. These numbers indicate concern and in general dissatisfaction with the current situation. Even if one does not leave shipping, the fear of finding themselves in a similar situation is not unreasonable, in accordance with the reasons that created it, but unjustifiable for the majority of shipping companies that do what they can to help their people.

Last but not least, we should not forget the enormous number of seafarers that cannot embark due to banned crew changes from several ports (e.g. Singapore) and they are in dire financial straits.

3.5 Untimely sign-offs – Nostalgia for home

The biggest emotional challenge which every seafarer face due to insufficient number of crew for substitution, as a result untimely sign-offs, is living apart from home. According to the results of the research republished by the Panhellenic Association of Merchant Mariners:

- The 95% of the seafarers faced the absolute ban to shore-leaving
- The 2/3 of the seafarers could not disembark from the stairs of the ship while the 1/3 that disembarked did so to measure the vessel's drafts.
- The same research found that prolonged stay at sea, without the possibility of shore-leave or even exit at port, has affected their mental health in 88% of respondents. The situation of those who travel long distances is particularly burdensome.

- Another interesting element of the confinement was that while the means of entertainment on the ships increased, a considerable percentage of seafarers did not show any substantial interest in them.
- The same survey shows that only 14.5% of seafarers during this period were repatriated after the expiration of collective agreements and the majority of them were faced with the extension of collective agreements against their will and in some cases, it was extended beyond 12 months.
- The 32% stated that they were not compensated for the infringement of their contract.
- Regarding the provision of medical assistance, the 15.4% of the seafarers considered that they had insufficient medical access and care on land.

In conclusion, the research points out that the abolition of seafarers' exit permits harms their mental health and the extension of their contracts, against their will, is a violation of human rights. However, automatic renewals are de facto necessary, as states do not allow sailors to disembark and return to their homes.

Unit 4 - Accidents caused by fatigue

2.1 Sheng Neng 1

Shen Neng 1 is a 230-metre-long bulk carrier that left the Port of Gladstone directed towards China carrying coal. On 3 April 2010 the vessel was traversing a well-known shipping route south of the Douglas Shoal when it ran aground 38 nautical miles east of Great Keppel Island at about 1705. The impact tored the ship's fuel tanks and released approximately 4 metric tons of fuel oil into surrounding waters.



Picture 3- Sheng Neng 1 after grounding

Following an initial assessment, Maritime Safety Queensland (MSQ) activated National Plan response arrangements. Australian Maritime Safety Authority (AMSA) immediately mobilized key personnel and airlifted a surveyor onto the vessel to carry out damage assessment. Response crews were activated in Brisbane, Gladstone and Rockhampton. Emergency supervision aircraft were placed on standby to inspect the scene at first light. Oil booms and skimmers were deployed to contain and recover the oil, and dispersants were applied by light aircraft as soon as practicable.

Professional salvadors (Svitzer Salvage) were employed and boarded the Shen Neng 1 on the morning of 4 April to begin the process of refloating the grounded ship. The initial damage report showed the main engine room was breached, and the main engine and rudder were both damaged. Sea action was causing the ship to move on the reef, creating further damage and increasing the risk of break-up.

Before attempting to refloat the vessel, the oil had to be transferred from vulnerable tanks to more secure tanks in order to stabilize the ship and its cargo and minimize the risk of further oil spill. Following the successful internal transfer, 200-metre lengths of containment boom were placed adjacent to the grounded vessel, as an important pollution prevention measure before oil could be pumped off the ship. By 10 April, 400 tonnes of fuel oil and oily water had been pumped off the Shen Neng I.



Picture 4- A boom trapping oil on the surface of the ocean

Eventually, Maritime Safety Queensland agreed with a request from the salvors to ‘blow down’ the vessel’s breached tanks with high pressure air to ensure the tanks were clear of oil, before an attempt to lift the grounded vessel commenced. Damage to the ship’s hull caused fuel mixed with seawater to be trapped in hard-to-access tanks, making it difficult to extract all trapped oil. Each tank was sounded and ‘blown down’ separately, with booms in place to contain any oil that may have escaped.

That incident happened because the officers of watch (OOW) were so fatigued after supervising the loading of coal at Australia’s Gladstone port that they were not fit to carry out a navigational watch, concludes the Australian Transport Safety Board’s investigation into the subsequent grounding.

No fatigue management was in place and the grounding occurred because the chief mate did not alter the ship’s course at the designated course alteration position. “His monitoring of the ship’s position was ineffective and his actions were affected by fatigue”, says Australia’s Transport Safety Bureau (ATSB).

The ATSB identified four safety issues during the investigation:

1. There was no effective fatigue management system in place to ensure that the bridge watch keepers were fit to stand a navigational watch after they had supervised the loading of a cargo of coal in Gladstone;

2. There was insufficient guidance in relation to the proper use of passage plans, including electronic route plans, in the ship's safety management system;
3. There were no visual cues to warn either the chief mate or the seaman on lookout duty, as to the underwater dangers directly ahead of the ship;
4. At the time of the grounding, the protections afforded by the requirement for compulsory pilotage and active monitoring of ships by REEFVTS, were not in place in the sea area off Gladstone

2.2 Thor Gitta

Thor Gitta is a 102-meter bulk carrier which was built in Poland in 1996. At the time of the accident, Thor Gitta was registered in Denmark and classed with Germanischer Lloyd.



At about 2345 on 18 May 2009, Thor Gitta commenced loading a cargo of mining equipment in Fremantle, Western Australia.

Picture 5 - MV Thor Gitta

At about 1100 on 19 May, all cargo operations were completed. While Thor Gitta was in Fremantle, the master had been monitoring a low-pressure weather system (low) in the southern Indian Ocean, to the southwest of Western Australia, which was moving eastwards. At 1900, the Australian Bureau of Meteorology (BoM) issued a forecast, valid for 24 hours, which contained a gale warning for an area within 600 miles of the low. Winds were forecast to be north-westerly to south-westerly at 15 to 25 knots, increasing to about 35 knots. Seas were forecast to be moderate to rough on a moderate to heavy swell.

At about 0930 on 21 May 2009 while the ship was about 390 miles northwest of Fremantle, Western Australia, in preparation for the expected rough weather, the cargo lashings in the hold were inspected. The cargo was secure but additional lashings were put on the bins containing unused lashing equipment (lashing bins) which had been secured at the forward end of the ship's tween deck. A crew member that was on board the general cargo ship Thor Gitta, was fatally injured while attempting to secure lashing bins in the cargo hold.

The investigation found that the crew member was probably affected by fatigue as a result of the duty roster and the ship's movement in the heavy seas. As a result of this accident, the ship's manager has implemented a range of measures on all its vessels to

improve the security of bin lashing arrangements and manage the risks of carrying out tasks associated with operation of the bins.

The ATSB has issued one safety recommendation to the Danish Maritime Authority relating to the use of the 6 hour on/6 hour off work routine and the effect that that work routine has on a crew member's level of fatigue. The potential for fatigue in seafarers is high. Ships are dynamic work environments which operate on a 24/7 basis and do so with small numbers of crew, on a platform which, unlike similar operations ashore, is subjected to vibrations, noise and movement caused by both mechanical and natural influences.

Unit 5 – Solutions of fighting fatigue

5.1 Ways prevent and mitigate fatigue

Although I do not have medical knowledge, I appose some indicative points that may be helpful for someone trying to fight fatigue. Seafarers ought to follow MLC's regulations to prevent and mitigate fatigue.

1. Take breaks when they are scheduled
2. Eat well-balanced meals and drink water
3. Exercise regularly
4. Avoid alcohol consumption
5. When someone has symptoms of fatigue talk to them or ask medical help



“A healthy mind in a healthy body”

was what the ancient Greeks said in order to demonstrate that both mental and physical health are an integral component of human health.

5.2 MLC Standards / Basic Requirements for prevention of fatigue

The MLC provides some standard requirements for seafarers' welfare. These may be summarized as:

| | |
|--|--|
| <p style="text-align: center;">Wages</p> | <ul style="list-style-type: none"> • Seafarers are to be paid in full for their work at no longer than monthly intervals. • Seafarers are entitled to a monthly account showing their monthly wages (or wage slip). • Allotments of wages must be paid in accordance with a seafarer's instructions. • Charges for remittances/allotments must be reasonable. |
| <p style="text-align: center;">Hours of rest</p> | <ul style="list-style-type: none"> • The MLC recognizes the fundamental principle that normal working hours in other workplaces are based on an eight-hour day, with one day of rest per week. • The MLC allows countries to determine maximum work or minimum rest criteria, but requires that in doing so they must take into account the danger posed by fatigue. • The MLC provides two options, the first being maximum hours of work of 14 hours per 24-hour period and 72 in a 7-day period. The alternative being a minimum 10 hours rest per 24-hour period and 77 in a 7-day period. • The ship must keep records of a seafarer's work and rest. |
| | <p>Seafarers' accommodation must be safe,</p> |

| | |
|--|--|
| Accommodation & Recreational facilities | decent and consistent with promoting seafarers' health and well-being. This includes: - heating and ventilation - size of rooms - noise and vibration - sanitary - recreational facilities - lighting - hospital accommodation |
| Food and water | <ul style="list-style-type: none"> • The supply of food and drinking water must be appropriate for the seafarers on the ship. • The galley and other equipment used to prepare and serve meals must be hygienic. |
| Medical care on board ships | <ul style="list-style-type: none"> • Seafarers must have access to prompt and adequate medical treatment while working on board. • Seafarers must be allowed to visit a doctor / dentist without delay in ports of call. • Seafarers at work must be provided with appropriate health protection and care, at no cost. |
| Health and safety protection and accident prevention | <ul style="list-style-type: none"> • Reasonable accident prevention measures and precautions are to be taken on board. • Ships are to have an on-board policy and/or program for the prevention of occupational accidents, injuries and diseases. These are to be made available to seafarers. • Ships are to have a ship safety committee, with a seafarer safety representative and regular meetings. |
| Repatriation | <ul style="list-style-type: none"> • Seafarers are entitled to be repatriated, at no cost to themselves, in the following circumstances: <ul style="list-style-type: none"> » If the seafarer's employment agreement expires while abroad |

| | |
|--|--|
| | <ul style="list-style-type: none"> » When a seafarer’s employment agreement is terminated (by the shipowner, or by the seafarer for justified reasons) » When the seafarer is no longer able to carry out his/her duties under his/her employment agreement or cannot be expected to carry them out. » If having been working on board the ship for 12 months. • Shipowners are required to provide financial security to ensure that repatriation will occur. |
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| | |
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| <p>Seafarer Employment Agreement (SEA)</p> | <ul style="list-style-type: none"> • Each seafarer must have a copy of his/her seafarer employment agreement (SEA). The SEA must be signed by the seafarer and the ship owner or their representative. • The SEA must contain contact information of the seafarer, the capacity in which they are employed, wages, annual leave, termination, health and social security protection, entitlement to repatriation and reference to collective bargaining agreement (if one is in place). • Seafarers must also be given a document containing a record of their employment on the ship. • Where a collective bargaining agreement forms all or part of the SEA, that agreement must be on board. |
|--|---|

**Table taken by ASWC (Australian Seafarers’ Welfare Council) Full details on the MLC requirements may be found on the ILO or AMSA website.*

Do's FOR SEAFARERS



This infographic features a central illustration of a seafarer in a yellow uniform and hard hat, holding a clipboard with a calendar. Surrounding him are eight circular icons, each with a text box describing a 'do's' for seafarers:

- Exercise regularly**: Represented by a dumbbell icon.
- Take strategic naps**: Represented by a clock icon.
- Keep proper "sleep hygiene"**: Represented by a bed icon.
- Drink sufficient amount of water**: Represented by a glass of water with H₂O text.
- Eat well-balanced & regular meals**: Represented by a plate of food icon.
- Consider relaxation techniques**: Represented by a person in a yoga pose icon.
- Fight against boredom**: Represented by a stack of books icon.

Do's FOR MASTERS



This infographic features a central illustration of a ship's master in a dark uniform and white cap, holding a clipboard with a calendar. Surrounding him are seven circular icons, each with a text box describing a 'do's' for masters:

- Ensure shipboard conditions are well maintained**: Represented by a ship icon.
- Apply job rotation to break up monotony and keep crew alerted**: Represented by a circular arrow icon.
- Schedule drills in a proper manner to minimize the disturbance of rest/sleep periods**: Represented by a calendar icon.
- Increase crew awareness on the long term consequences of fatigue**: Represented by a warning sign icon.
- Control watch-keeping practices and assignment of duties to ensure adequate rest is received**: Represented by a person with binoculars icon.
- Include fatigue-related lessons learned in safety meetings**: Represented by a meeting icon.
- Give crew sufficient time to overcome fatigue**: Represented by a clock icon.

Conclusion

Unfortunately, risk management was short-lived. The purpose of this dissertation was a scientific approach to the phenomenon of fatigue, the demonstration of the real prevailing situation in the working environment of the average seafarer and proposing appropriate solutions to the problem. Through the recording and analysis of the factors that contribute the feeling of fatigue of the sailors it was understood that their number is wide and multidimensional, making combating fatigue extremely complicated an issue that poses a potential risk to the well-being of the shipping industry.

It has been mentioned many times that the fatigue factor is one of them major reasons for causing accidents at sea. Shipping companies have to make efforts to reduce the feeling of fatigue their seafarers reinforcing three pillars: the human factor, ship management and environmental conditions. The feeling of fatigue is a silent enemy for the shipping industry.

Last but not least, let us not forget that sailors are already unquestionably tough employees. Shipping and the quality of work of the navy will not be improved hands of those who are not willing to invest in expensive and timeless solutions. The best way to prevent the appearance of fatigue is complying with MLC's Regulations (going by the book!).

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