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***ΠΤΥΧΙΑΚΗ ΕΡΓΑΣΙΑ***

**ΕΠΙΒΛΕΠΟΥΣΑ ΚΑΘΗΓΗΤΡΙΑ: ΠΑΝΑΓΟΠΟΥΛΟΥ ΜΑΡΙΑ**

**«SECURITY THREATS»**

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# Merchant Marine Academy of Macedonia

## **‘SECURITY THREATS’**

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## Abstract

Anything or anyone that may lead to danger of the safety of either an organization or something else may be referred to as a security risk. Besides, when one offers information to a competitor or an enemy that could hurt a firm can be dubbed as a security risk.

Security threats are an ongoing reality which exists in many aspects of our lives. In places like merchant ships which are dispatched from the masses of the shore, free in the sea, a security threat may endanger at a greater aspect.

Working on vessels is seemed to be among the riskiest jobs globally (Dachev & Lazarov, 2019). Individuals who possess inadequate immune systems and short-sighted ones are at the most significant risk as they encounter more severe mental and physical challenges. Also, individuals that perform their duties in the shipping industry are among the people who face the greatest danger when on open sea.

To put it in perspective, the possibilities of getting help on open sea are far less than being in a remote village asking for help. Our oceans are enormous, so much so, the human mind cannot conceive that it may take half a month to be able to save a shrinking ship at an emergency.

The fact that there are seamen who do not take the suggested precautions as far as security is concerned, speak volumes about the importance of a good educational

system ashore. It is impossible to analyze every security threat there is in this job, so in this paper I am going to discuss the security risks that seamen are likely to face in their line of duty and also, to analyze three main security threats that are most common to seamen and are the most likely to come across, in their carrier. This, would be the main idea of the discussion, the exact risk and then a possible solution.

Security risks themselves are something which have been a topic of prolong discussions for many years in seminar meetings and has been given a great focus on various departments of companies.

The severity of the risks of security are not discussed thoroughly in the academies as there are so many things a seaman should learn in order to be able to perform his duties. For this reason, more awareness should be given on preventive measures and deep understanding on the outcome of our actions on ship.

## 1. Piracy



## **Definition**

The International Maritime Bureau (IMB) defines piracy as:

The act of boarding any vessel with intention to commit theft or any other crime, and with intention or capacity to use force in furtherance of that act.

### **1.1 Is piracy still a thing?**

Piracy has probably existed for as long as the seas have been plied for commerce. Ever since the beginning of the organized transportation of cargos by merchant vessels, small groups of people (self-called pirates) had been formed putting in danger the safety of the crew, ship and cargo transported. Even though two thousand years have passed since people have started sailing, piracy is still a sad reality modern seaman have to face sometime during their carrier.

Pirates have somehow changed over the course of history. Today, they are pictured as campy villains, like Captain Hook in Peter Pan, or kind of rock n' roll like Jack Sparrow in the Pirates of the Caribbean.

Piracy is a real threat and in the Gulf of Aden, Gulf of Guinea and lots of other places where there is no much control from governments over the sea borders of their countries. These places where piracy is contacted and especially Nigeria where ships are not allowed to take arm guards on board, are number one in terms of piracy, challenging all the bypassing ships. Piracy is still a thing and a very controversial topic in lots of global shipping meetings occurring every year.

It affects the global marine businesses putting at stake thousands of ships, crew and billions of dollars in cargo. To put it into perspective, 90% of all goods transported globally, happens with the solely transport within ships. If global shipping risks loose or slow down due to piracy, one can imagine how devastated things would be for all countries' economies.

Of course, piracy has evolved with time and now todays pirates have high tech equipment including radars, ECDIS and every communication means one can imagine.

The global damage caused by piracy is estimated at \$6.6 to \$6.9 billion through commercial fraud, loss of cargo or delay. Such incidents can scare investors or prevent a possible future development that a company or government may want to do. Despite that though, as in every crisis, there are people who profit from that and have created businesses in the name of sea safety.

The crowning jewel of them all, even and not only because it bears what might be the most controversial topic, is that there are suspicions of state involvement, in piracy attacks that have alarmed the shipping companies and the countries in which these companies operate. In the 21<sup>st</sup> century it seems unbelievable that some countries profit on such criminal activities which affect the economies of other countries.

## **1.2 Why do we still have piracy anyway?**

Well, this is a question with an answer which seems to be somehow complicated bearing in mind that we still have not succeeded in erasing this phenomenon centuries ago. In an era, in which we send spacecrafts into space, that can control aircrafts from an unparalleled distance and the creation of accurate radars that have succeeded in mapping every single inch of our planet, it is almost ironic how we have not been able to succeed in our war against pirates. It sounds strange that there has not been found any solution.

Looks can be deceiving though. Behind this crime there are vicious people with millions of dollars in gains from ransoms in lump sum a lot of times in the multi-million-dollar spectrum. Furthermore, it is far more complicated in the political spectrum to control or cooperate with corrupt governments of other nations so as to succeed and eliminate the pirates.

### 1.3 What caused piracy?



**The capture of Blackbeard, 1718**

Piracy is a crime of opportunity. The Pirates work in an environment which lacks proper laws, and in unstable governments in which controlling factors are very low. Thus, the creation of a sea crime becomes easy. Many of the reasons why people of these nations decide to get themselves involved in piracy are the overpopulation and hunger which drive people to extremities. But if we want to date back the piracy at a specific time where it was at its peak, we can see a very interesting yet unpleasing for today's perception era.

One of the reasons for today's piracy and its dark past dates back at the midst of the 16<sup>th</sup> century when colonization of European countries became more antagonistic than ever. European affluent countries with powerful navy such as England, Spain and Portugal fought for a bigger piece of global trade. Pirates with the blessing of Queen Elisabeth the I circumnavigated the globe and brought back treasures by pirating. *Sir Walter Raleigh* who was a pirate knighted by the Queen founded a colony in Virginia naming it after her as "The Virgin Queen". Which was his actual purpose? To create a pirate base camp which Queen Elizabeth actually nicknamed as the "Pirate Queen"

because she venerated pirates. She called them her “Sea dogs”. Her intention was to expand her empire and to harm her rivals by robbing their ships.

“Blackbeard” for example was a famous pirate who among other things was trading slaves with its famous ship “La Concorde”. It is difficult for us to understand trade at that time without understanding slave trade, because slave labor was behind almost all of the goods produced and shipped across the Atlantic.

So, in terms of why we are here and pirates there, pirates are just on the wrong side of history. Politically, the civilized states that form the world we know today came out on top of people whose effort, work and exploitation by the powerful (nations) created immense wealth we enjoy today. That is, in a large part, those states were so successful by doing something barbaric; trading slaves.

During the 1700s pirates just could not compete with others as the slave trade became more industrial in scale. They were transporting millions of Africans to Europe’s colonies in the Americas where their labor generated enormous wealth, solidifying the global dominance of the European powers and, ultimately the U.S. As we can understand the so called “civilized west” exploited vast resources in many countries for so many centuries at an unprecedented rate, leaving them, at their colonies fall, unorganized and deeply polarized.

Other factors which will be reported, can actually sum up the idea that the mistakes of the powerful countries are what today’s maritime industry is paying off as a consequence.

### **1.3.1 Chronic unemployment**

In this case, when we consider unemployment as a factor of the increase of piracy, we shall not discuss the unemployment western countries face nowadays. In the underdeveloped African countries, chronic unemployment deprives people of finding a fulltime job or having an unofficial one, with little opportunity in the long run. Years of western exploitation with a combination of the aftermath of colonization with unstainable governments and corruption have led to a slow transition in new technologies, and as a result to low production which affects the overall economy and of course the everyday life of millions of people. The health system which is affected by continuous poor resources from various governments is a contributor to the

frustration of Somali people for a better future they strive to live. These packages of problems (bad economy, healthcare etc) have starved to death millions of people with the hunger statistics of 2018 indicate that in Yemen almost 13% of people are having severe difficulties finding food, a 0,70% increase from 2017. In Somalia the new statistics of 2021 show that up to 2.7 million people face acute food shortages in which 839.000 are children under five. In the last famine more than 260.000 people died, half of which were children. Poverty is a significant motivator for pirates.

The life of a pirate is pretty much predefined which often ends with death, so in order to make ends meet or in that case stay alive, pirates are willing to do extremities even if they have full knowledge on the consciences mentioned above.

### **1.3.2 Political agenda**

After the colonization ended, many countries found themselves fighting each other over power. Colonization essentially put under one umbrella different minorities and ethnicities which were not together as one in the past. After the fall of the empires and the independence of the ex-colonies, people started having conflicts with each other. Diversity among people over religion, ethnicity and a feeling of inferiority of an undermined colony past, made countries such as Somalia unstable and drove them away from true development, education and western ideas.

A state has less capacity to govern its maritime space when it is focused on a crisis within its borders. Pirates do not just emerge out of nowhere. There are certain structures in places that, in some cases facilitate or, in some other (cases), necessitate the idea of individuals working outside of existing structures to sort of proliferate from illegal activity.

### **1.3.3 What can be done to beat piracy**

There are several factors one can look up to, so as to be able to defeat the monster called “piracy”. But let me be crystal clear when I say that if we consider to eliminate this horrendous phenomenon that is so deeply rooted into people’s life, it would require a lot of time and expertise.

Believing that by implementing specific actions we will come to ends with the pirates at no time is an understatement. But as they say “they began is half done”. And in this

way, year after year, with small steps and implementations we can start to steadily eradicate if not try to eliminate a lot of actions from the pirates' side. Actions that are damaging in so many ways so many people. So, in that way, we will be able to see the light at the end of the tunnel and we will not stand in an ominous future. Such actions can derive from many sources with governments being the most influential ones.

Governments with merchant and naval activity should create and activate work in a "sea justice" system.

What would be the purpose of making and voting laws if they are not implemented?

The guiding principle that enemies of mankind can be captured and tried by any country regardless of nationality was established by an international piracy law. "Hostis humani generis" is the Latin saying for "enemies of all mankind" and it means that the governments of the legitimate world in the early 18<sup>th</sup> century referred to the Pirates of the Caribbean as, even though pirates have existed for as long as ships have been at sea like ancient Mediterranean pirates.

Piracy, in fact, inspired the concept of "universal jurisdiction" which allows any nation-state to act against transgressors, even if it is not a victim of the crime. International law on piracy, which reflects universal interests, is firm on principle but mushy on enforcement.

It is not clear, for instance, whether a merchant ship's captain and its crew have the right to shoot armed pirates boarding their ship, unless the pirates shoot first. This is lame—and it is one reason freighter companies do not want armed marshals onboard. There is no room for deviations when it comes to pirates, especially when lives of humans are at stake.

Piracy is a criminal enterprise and should be treated as such.

Enhancement of laws and rules protecting the victims and not the perpetrators shall be at everyone's top priority. We do not get the pick and choose on anyone who will be shot or not, but when actions are being taken against piracy there should be a legal environment where crew and ship owners are reassured about clarity of justice against criminals.

The world must come together to end the scourge of piracy. Apart from that, there are several options, numerous times being thought from companies and discussed through years of meetings and conventions.

Some of them are:

### 1.3.3.1 Defense



First and foremost, the best protection against pirates is simply to avoid encountering them. Since that cannot always be achieved, simple solutions such as the fitting of wire cutters by one but preferably two layers may seem useful to gain some time for officers to take actions against pirates. Of course, watch keeping and vigilance by all crew shall be at everyone's top priority when at piracy areas.

Hoses ready to shoot water is also a great measure especially when they are on hook. Thus, if pirates are detected, officers on bridge will simply press the button to unleash water and make it difficult for the pirates to board the vessel. Water especially at mist is used as a burden for pirates to climb on the ship using their ladders. Mist creates an "umbrella" of small water particles which hardens the clear vision of pirates and that results to 1) slow down the procedure put in place from pirates to board the ship

2) adds an extra layer of protection by making it harder for people to board and 3) buys time for the officers and the crew to act according to their protocol.

However, it must be mentioned that the prolonged exposure of sea water on ship decks or hull corrodes the metal surface which then needs special treatment of at least 3 layers of specific paint in order to be fixed. Of course, this is a small sacrifice we take so as to have our safety, and it is something everyone is willing to do with no second thoughts and with great deal of responsibility in our minds.

At navigation side, AIS and the lights should be turned off with an exception of the navigational lights for obvious reasons.

Furthermore, the second officer should protect even more the crew and order them to work as closely as possible to accommodation in an event of piracy. It is the best practice not to let them do any extreme hard work such as painting the top layers of the accommodation or any high surface, as the option of changing route to a shore to visit a hospital is a major no-no in such situation.

At last, doors should be always closed when someone enters the accommodation and reports on which persons are inside is an important factor for officers on watch to know who is where at any given moment.

### 1.3.3.2 Army - Armguards



The African Union army (AU) or else African Union-led Regional Task Force is a multinational specialized army, authorized by the African Union's Peace and Security Council on acting against pirates and other rebels. A United States Navy and Royal Navy force is also a task force which could be enhanced on the efforts of fighting against piracy.

United States Navy and Royal Navy forces campaigned together against piracy in several occasions. The US navy is forward deployed across the globe working with its international partners protecting international shipping, and deterring, disrupting and suppressing piracy around the globe.

Naval operations to tackle Somali pirates or pirates in the Gulf of Aden or wherever piracy is operated, should be enhanced and special commanders should be hired. The framework for cooperation is already in place as also the expertise against such criminal behavior and action. By creating a common framework and a specific plan for army to

be involved whenever is necessary, we can substantially reduce phenomena of piracy and create a safer and more trustworthy place for merchant transportation to be flourished.

### **1.3.3.3 Government sanctions**

Countries with piracy at their borders should consider as their number one priority to eliminate their people of pirating as it affects their growth as well as the growth of other nations. Governments with usually authoritarian status should not be allowed to pay no attention at their sea borders, and if sanctions are to put some pressure on that direction, be it. The global community cannot sit and watch the deliberate actions against their vessels. Governments whose fleet is affected and those who are not yet affected by piracy, can come together and create a common framework on sanctions and discuss when they should be implemented. That would be useful so as when there is a behavior of non-conformity in the part of specific sea nations, sanctions to be implemented and therefore expected actions from their part thereafter to be taken.

All in all, in times when the majority of the global goods transportation is conducted by sea and the continuous routes of vessels, every nation must act like a one and behave responsibly. Pirates cannot point the finger as if they are some untouchable power which can demand ransom from stealing and kidnaping people. A holistic approach on defense army and government involvement should be at everyone's interest and always up front when there are discussions on piracy, its damage to global trading and the impacts on human lives. In the part of the defense, mechanisms such as razor wires give time to officers to act and activate companies' procedures on piracy matters. On the army's side, extra protection can provide a safer, more secure and mind free route on areas where piracy is more active and there is a greater danger of attack.

On governments' involvement, mechanisms such as sanctions have been historically proven to compact authoritarian behaviors and restored democracies, passed effective laws whose impact was vital in the prosperity of nations and compacted decent human rights which were overridden.

# Interview

First of all, I would like to thank capt. Delli on agreeing granting me this interview and helping me enrich my thesis which so happily worked on.

**1. What is the first thing that comes to your mind when you hear the word ‘pirates’?**

- The first thing that comes to my mind is ‘danger’. For me, pirates and danger is something that is deeply connected with its other.

**2. I will have to agree with that. Wherever pirates are involved, you can sense the danger in the atmosphere. Capt.Delli during your captaincy, have you ever found your ship in a situation of imminent piracy?**

- Well, if we consider as imminent the stage were pirates are onboard or having to shoot them, No, I haven’t had myself in such situation. What I have experienced though many times, is having the ship in a situation of high alert and also having the crew proceeding to citadel to protect themselves as a deterrent measure in case the situation gotten worse and pirates were about to board.

**3. During my two embarkations I too have experienced having to go down to the citadel in case pirates were to come close to us. What actions/measures did you take in your case?**

- All ships are following the security plan provided by their company. As everybody, so did we every time, with an extra protection from armguards send to our ship by the company so as to pass safer the ‘anti-piracy zone’. This security plan, mentions some specific steps to take, a protocol of some way and by following that, we as officers decrease the possibility of any kind of incident in the best possible way.

**4. Exactly, according to your experience, Is piracy something that you get used to, overtime?**

- I wouldn’t say that you could get used to piracy or any kind of violence overtime. It’s just the whole situation that becomes familiar and the feeling of what comes together with piracy just gives you the sense of familiarization.

**5. Do you think that pirates still pose a great threat to maritime industry?**

- For sure pirates are someone who pose a threat to maritime industry as vessels cannot travel freely in the areas where there is great threat of piracy. Thus, this ‘crime’ as I call the actions of pirates, disrupts the global transport industry which in its most part, is the marine industry as the majority of goods globally are transferred through ships.

**6. Indeed. 90% of all goods are being transferred with ships. I want to know what do you think about armguards onboard. They are hired for pragmatic reasons or do companies believe that by doing so, they would calm down the stress from the crew?**

- I believe that armguards are essential. The truth is that we cannot have them as crew, they are not vital in the way crew is in the up and running of the vessel, but their role is indeed important when the vessel is passing in areas where pirates are present. They are important because they offer safety. A seaman, feels safe when armguards are present in his work environment and due to that, he can focus at his work better by leaving the armguards do their part if pirates are to approach. So, in that matter, companies hire armguards for both realistic and phycological reasons altogether.

**7. I see what you mean. What is your prediction of the future captain? Do you see a pirate-free world any time soon?**

- I'm afraid No, I wouldn't say that we will have a sea-free maritime world and surely not in the years to come. It is an international crime and has been characterized as such by many. It could have been vanished a long time now if it was something so easy to overcome. Sadly, it is not encountered or shall I say it does, but not in the point where we are free of pirates. Because of that, I believe that we will still face piracy incidents if not more in the future and especially in west of Africa.

**8. I am afraid I have to agree. Life on sea is not a Disney movie, it does not have a predictable happy end. At last, what would you say to any young person that is considering to join the Maritime Academy and is hesitated due to what he/she heard about pirates.**

- I would encourage every person who he/she is considering of joining any maritime academy and advise them that piracy should not be a burden of their choice or any future carrier are to create. Working on ships is generally a workplace full of possible dangers, with piracy being one of them. However, it is a job which is very special, multifaceted and can provide you with very good salary. Whoever loves sea can create a very good carrier and taken the experience of the vessel it is possible to expand this carrier and knowledge outside of the vessel on shore, working for companies and any other subject affiliated with sea. Taking all that into consideration, I would definitely encourage young people joining the Maritime Academies of our Country.

**Capt Delli, thank you so much for your time and the knowledge you shared with me through your decade-plus carrier so far in the maritime industry.**

- The pleasure was all mine.

## 2. Cyber Security threat



Cybercrime is a rapidly growing threat in almost all aspects of modern life and the shipping and offshore industries are no exception. Safety of the ship has entered a new dimension. Ships and vessels in general may seem like unusual targets for cyberattacks but through the satellite communication ships are depending nowadays, hackers have found a new playground for attacks. In the world of automation and connectivity on ships, companies are depending more and more on the remote control through the use of the internet and satellite communications.

With these tools the companies have achieved an unprecedented access on ships data such as the exact position of the ships, the state of the ships and even the communication in the ships' bridge. That was not possible some decades ago and with that, the companies have better control on what is going on inside the ship. Moreover, the brokers can now control the exact route and speed of the ship to see if everything is run on schedule.

We have to mention that the widespread use of the internet telecommunications has brought along with the better control of ships routes an efficient, economical and faster internet connection for the seamen to use. The researches carried out the last few years have shown that seamen who are able to communicate with their families ashore, are more productive and pleased with their work and are more prone to stay longer at the vessel even after their contracts expire. With that perspective, we can see that the benefits of the satellite and the internet connection with ships have brought an ever-

greater working environment such as we have never seen before. Who can forget the one- or two-year contracts seamen had the previous decades and the conditions they were working in?

Furthermore, the new satellites and the general evolvement we enjoy today on ships are held accountable for the cameras and the safety they bring in case of piracy attacks. The new speeds can send even faster photos and videos to the company and sometimes live footage on what is around the ship.

As with every good technological prospect implemented in the maritime industry, there is a greater risk of breach of security. A rapid exposure of security risks has been noticed throughout fleets as hijackers, and shipping competitors are manipulating small gaps in the systems to provoke damages which as a result bring threat to ships security systems, and potential threat in asset loss.

Since 2017 all four major shipping companies have been victims of cyber-attack. In addition, according to Symantec's 2014 Internet Security Threat Report, in 2012 more than ten million identities that included real names, dates of birth, and social security were exposed by a single breach. Cyber-attacks are as serious threat to shore as to the sea. The target is usually the same and that is the extraction of money through blackmail.

Cyber pirates can remotely access to sensitive data of a ship just by sending an email to the captain. Hijackers are able to find the name and company of the captain through social media and can easily create a pattern on the crew and generally the position the ship is in. This method is called “fishing”.

*Addressing cyber security challenges:*

## 2.1 Manual risks



Hackers are becoming more and more sophisticated. Plugging in personal devices to operational equipment leaves a gaping hole in an otherwise tightly secure system.

By simply inserting a USB stick into a ship officer's computer, hackers can freely bypass the security measures IT department have installed, and have access to all the data needed for remote control of ships' screens and sensitive data as a whole.

The software installed into a computer is called "malware" and cannot be bypassed or treated by someone who is not knowledgeable enough on computer programming. This of course is known by hackers and this is the exact factor they base their operations on. After malware is installed in a computer the virus then usually transfers it to the others through the common system connecting them together and polluting them.

The aftermath of these actions is that the company has to pay hundreds of thousands of dollars in bitcoin or other cryptocurrency which is not traceable by banks or governments to the hackers in order to give back to its fleet the control of the ships system.

## 2.2 Remote risks



Cracking a ship's security codes can be a devastating situation for the company and the vessel itself. With the use of the satellite communication and by the same means the company contacts, checks and watches the ship's condition. Hackers now, can have access to the vessels' computer and change the condition of the ship, miscalculating the numbers of the cargo, inserting false numbers of speed, showing vessels on the ECDIS which are not in the vicinity and even eliminating the choices of the crew using the computers in order to get rid of the virus.

In short, remote access is a very real threat both at shore and in the sea but it is an additional difficulty on ship due to the lack of personnel able to board the vessel and fix the damage. Thus, a remote risk even though is not the only way to hack a system is for sure a very likely possibility of threat in a more growing dark business which hacking is the top leader.

## 2.3 Urge risks

Hackers rely on the natural human desire of helping others by using means of urgency. When it comes to social engineering hackers are to create a sense of urgency.

By calling in companies department such as the logistics department for example, which play's a prominent role with the companies finance and therefore all companies'

expenses that are passing from their hands, hijackers use information found online in order to distract money.

The following can be an example; Knowing that a ship usually gets fresh provisions each month, a hijacker can call a company at a late time, often when not a lot of people are at the company, and through the captain's information he/she found online can pretend to be the shipper of goods and ask for money—extra additional costs-.

Taking into advantage the lack of other colleagues to assist and inform the person on the other line, the advanced hour and the urge of others to help and tidy up the ships need of fresh provisions, hijackers bet that can easily distract money in little time and with the minimum effort. Taking this into consideration, we can see that hijackers have mastered their skills on how to use limited information in order to extract money in a very simple yet so clever way.

### **2.3.1 Possible solutions**

- 1) Don't over share! Be careful on what you post online. There are countless incidents from theft to kidnaping solely based on information people themselves shared online. There is no need for people to know when you embarked or what is the name of the ship you joined, what you do on the ship or what are the other crew members. Be thoughtful of the dangers you put yourself in, and bear in mind that not everyone wants your good. Secrecy can be your ally for a safe working life and also personal peace of mind. Everything you put online stays forever. So be aware of your internet footprint.
  
- 2) **THINK BEFORE YOU CLICK!** Research the facts behind emails and their attachments. Cyber security is just as much a question of culture and mindset as technology is. Watch very carefully when you press a button and always double check who is the sender of the email. Try to compare it with previous emails already being sent to a ship accounts from the known and specific departments of the company. Watch for errors, repeated spelling mistakes and unprecedented unknown information. Don't log on sites which are not secured (lock sign) or do not have the "https://" in the start of the upper tap bar.

3) Create a cyber security mindset! Educate yourself on the dangers the internet creates. Contact your company's IT department on what dangers are at stake. Ask for advice and don't hesitate to contact with them at any point you feel uncertain. The department will be more than happy to prevent a bad incident than to have to deal with it when it might be very late. Don't let the people of the shore coming on the ship to insert sticks on the vessel's computers neither have plain site access to the vessel's emails. Lastly, passwords should never be revealed nor be visible on paper at the computers screen. By doing all these you start to create a cyber security culture which is as important as the knowledge of safety with the machinery and your PPE.



Breaking into a ship's computer or manipulating a company's department should not be that easy. Bad practice should be eliminated and the crew at all points should have the security in their minds both at work and around their personal lives outside the ship. Seamen should understand that their actions online can affect not only the company's interest but their own safety as well as their colleagues' safety. In recent years, cyber security has become a topic which is talked about, and shared experiences have become true lessons in order future incidents to be avoided.

As the internet and telecommunications through satellites conquer the ships, more and more people at the name of safe sailing will try to manipulate the new reality for their own benefit. Companies but most importantly crew shall implement new methods and shall not be afraid of change as all along the shipping industry have been adapted to every change the marine industry faced.

On this matter, implementations of connecting ships with satellites should not be a rejection because of the problems we see it brings but because of rather a healthy debate and a new point of view on what major benefits in safe sailing and improvement of the overall state of working on ship can be reached.

### 3. Security Threats on cold environment



There are multiple security risks that seamen face in their careers, especially in cold environments such as the North Pole and the Arctic areas. Climate change is causing the shrinking of ice on the North Sea route, which has led to new opportunities for many companies and individuals. The melting ice is creating new and shorter shipping routes, leading to low transportation costs of raw materials, which means low fuel costs. For example, underneath the Arctic, there are massive oil and gas deposits, which have attracted companies from Russia, China, and the U.S.A as they battle for undiscovered oil and gas resources. The melting of ice means that new fishing territories will push fishermen to the Arctic. The thawing of ice cover is leading to improved ocean access, creating shorter routes for trade.

Individual shipping to Japan through the Suez Canal would take 30 days and 25 days from New York through the Panama Canal. However, travelling from Europe to Asia using the Northern Sea Route would take 18 days and 21 days for the U.S.A to Asia trip instead of 25 days (Ng, Andrews, Babb, Lin, Becker, 2018). Therefore, countries such as Russia are in a hurry to control these routes because they create business opportunities. Companies are hurrying to install fiber optic cable across the Arctic Ocean.

The new routes have also attracted tourists as they navigate the North Pole learning and enjoying the available wildlife such as the polar bear. Some of the Arctic sailors are researchers and many lack the necessary training and education on navigating through extreme conditions, which expose them to severe security risks.

The above analysis indicates that there are many workers and travelers across the Arctic. They include miners, tourists, traders, and researchers. However, there are many risks that all these crews face when operating in such extreme cold conditions. For example, ship radiators may clog due to heavy fine snow on the Arctic, leading to shipping breakdown. Fuel tanks must have a hot well to ensure that the diesel remains warm (Vincent, 2020). Additionally, apart from clogging of even shipping lanes, ice may sink a ship as it destabilizes it by adding weight to upper decks, which exposes seafarers to death and injuries. The working equipment such as drilling equipment may freeze, making work difficult for the oil miners, leading to low and slow productivity (Mellor, 1986). Furthermore, extremely low temperatures can lead to forming of ice crystals in a worker's veins blocking the blood flow.

Such a scenario may lead to a frostbite, which is a health risk to any seafarer because it leads to permanent body damage or amputation, conditions that may lead to job loss (Giesbrecht & Wilkerson, 2006). Poor health means that a tourist or an oil company worker will no longer be productive and may require raise on health benefits, which is costly to employers. Therefore, many sea workers who develop frostbite risk lose their jobs. Ice is also slippery, which means that workers are at risk of falling and injuring their bodies while working in the Arctic extreme conditions (Giesbrecht & Wilkerson, 2006).

Seamen are in danger of suffering from frostbites. Furthermore, challenging weather conditions, especially in cold environments such as storms and hurricanes, are typical to seamen (Dachev & Lazarov, 2019). Slipping and falling is usually common among seafarers. However, the severity of these bad weather conditions makes seamen

suffer from stress, and hard for them to get enough rest as their minds and bodies are nervous. Such negative encounters have long-term psychological effects on the health and wellbeing of seamen. The climate changes have led to ice melting across the Arctic, which means that ice strength has been comprised and workers risk fall injuries working on the weak ice covers. The security risks exposed to workers or Arctic explorers result due to unfamiliarity with sailing equipment. For example, frostbite may result due to poor dressing (Giesbrecht & Wilkerson, 2006).

All Arctic travelers or workers need to have an adequate knowledge of lifesaving first-aid as clogging may make a boat or a ship capsize requiring one to conduct first aid on another ship crew. One must also have the proper communication and navigation equipment such as a radio or a walkie talkie, a map, GPS, and a compass (Mellor, 1986). Travelling the North Pole also requires one to have emergency beacons and satellite telephones. The ice may lead to a breakdown in the isolated arctic, which requires the crew to get itself to safety. Therefore, crew members must be familiar with small/rubber boats and safety equipment such as life jackets and survival suits.

In addition, apart from life jackets, sailors must have floating equipment in case of falling overboard. Also, all seamen must carry a flashlight because travelling across the Arctic means remaining in the water even after dark. The flashlight may help in warning other approaching vessels in case the ship experiences navigation lights breakdown. The seamen also require warm clothes. Caffeine or alcohol should be avoided. Repair equipment and tools are also essential as propeller or air filter breakdowns due to ice require constant repairs.

The global warming is affecting the health and well-being of the seamen and their food security. The Arctic warming is also damaging the available infrastructure. Therefore, Arctic sailors have to go through difficult time to navigate an area with damaged infrastructure. The infrastructure damage results from erosion or permafrost thawing. About 70% of the Arctic infrastructure is built on permafrost and the ground instability due to the melting ice. Recently, a storage tank burst due melting permafrost in Norilsk Russia led to oil spill of about 150,000 barrels, which polluted the Arctic Ocean.

Companies in the Arctic are incurring daily loss amounting to \$100's of billions due to constant damage of pipe lines, power stations, and manufacturing facilities. The sailors also risk attacks or arrests because of increasing tensions in the region. The melting of ice has led to new water passages attracting commercial shipping, mineral extraction, fishing and tourism. However, countries such as Russia and Canada have

proposed changing the passage through the Northern Sea Route. Therefore, sailors' risk is being caught up in the conflicts.

The tourists may end up not seeing any wildlife because Arctic animals depend on ice for survival. Polar bears are at risk of extinction as well as foxes and snowy owls because of the melting permafrost. Additionally, the sailors face animal attack threats because loss of their habitat means conflict with Arctic sailors as they look for habitat in their camps as their sea ice habitat disappears.

The sailors also face methane threats. Frozen ice stores large amounts of methane, greenhouse gas, and during thawing; the gas is released, increasing the rate of warming. Breathing the gas may lead to memory loss, headache, and vision problems.

When faced with a health problem or an accident, the sailors require rescue. However, the melting ice may make some routes inaccessible, making it difficult for rescue crews or clean crews. Companies such as "Shell" have acknowledged that the oil drilling companies working in Arctic region do not have the appropriate technology to drill on ice because drilling may lead to accidents. According to the company, drilling requires avoiding icebergs but the climate change is increasing the number of icebergs around the drilling platforms, thus increasing the risk of operation. Managing drilling accidents is so difficult that a company has to obtain a social license to comfort the workers that drilling will happen without accidents.

It illustrates that sailing across the Arctic means putting life at risk. The melting ice is a risk to ships and its crew as thawing leads to infrastructure damage, which is a recipe for sea accidents. Accidents require rescue crew and, in such areas, their access is limited, which means that any accident caused in the region means death for the sailors. Additionally, the cold water puts sailors' health at risk, which has led to job loss among oil drillers along the region. The equipment is at risk of freezing including the ship oil requiring sailors to camp in the region.

A successful sail through the Arctic requires people to pay attention to equipment packaging. It is essential that one considers watertight and shockproof packing as well as straps in case one is required to lift equipment. While packing, it is also essential that people pay attention to equipment's weight and volume because they have to agree with their means of transportation. The equipment that people require while at the Arctic needs to provide maximum security because the place has many risks which include fall injuries, health risks due to extreme cold, as well as wildlife attacks because polar bears inhabit the region (Mellor,1986).

The Arctic has a harsh and variable climate and different means of communication are necessary. Therefore, adequate training and education are essential on how to use a personal locator beacon. The employer can use it to search and rescue oil workers or fishermen. Apart from personal equipment, one must fulfill legal requirements such as a work permit, a radio license permit, as well as firearm permit for those engaging in National Part expeditions. Personal/work insurance is also necessary to cover in case of an injury or accident that may lead a worker to lose a job. This is usually covered by the shipping company however this might not always be the case.

### **3.1 Frostbites**

As a result of coldness, freezing may occur on seamen's skin, leading to frostbites injuries (Shan, 2020). At first, the skin gets cold and turns red, white, or grayish-yellow in color, then hard and numb. Also, clumsiness mostly frostbites are common on toes, fingers, ears, nose, chin, and cheeks. Since seamen's skin is frequently exposed to cold and windy, they are at a very high risk of getting these bites.

These bites occur in frostnip. Being the first stage, the frostnip is usually mild, and continued exposure to coldness makes the affected get numb. The next stage is the superficial bite, If the skin is rewarmed at this stage, swelling with fluid appears on it. The final stage of frostbite is the severe or, rather, the deep stage. At this point, all the skin layers are affected and also the tissues beneath it. Sensation to cold and even pain is lost at this stage due to the death of tissues. Frostbite is a serious condition and at its very worst a permanent one. As a result, the seaman who has been through that could be at a very high risk of losing his job as companies do not want people with disabilities or deficit of fingers for example. Not to mention the high cost of medical care and insurance.

### **3.2 Storms and Hurricanes**



Every seafarer usually wishes for calm seas to have smooth sailing experiences on their vessels' journeys (Dachev & Lazarov, 2019). Tropical storms, hurricanes, and depressions regular in rough weather conditions such as in cold environments often cause sea vessels to get damaged and risk seamen lives.

The freezing North Sea filled with icicles during the winter season forms on railings and the freezing situations are usually testing for seafarers. Moreover, additional extreme weather and sea hardens the vessels course and additional monitoring on the weather and the course is needed. Adverse weather with the combination of not well-adjusted cargo on loading can bring devastating consequence.

An example of such incident can be from a report of the Swedish club, on a container vessel whose half cargo had been damaged due to a combination of bad loading and heavy weather, resulting in claims from the part of the buyer.

Changes of the vessel course due to heavy weather can add up the expenses and the estimate time of arrival. Of course, this is a measure worth taking and highly recommended by the companies as the safety of the people, the vessel and the cargo comes first.

### **3.3 Lack or Limited Cold-Weather Clothing**



The cold-weather clothes that seamen are given often get wet in their journeys and make them uncomfortable as the attires cannot dry overnight; hence, they face cold weather situations in damp attires (Shan, 2020). They are not even offered any clothing to wear in the cold weather, or maybe the amount of cold-clothing available to share among the crew is not enough; hence they end up facing unbearable cold weather conditions, which is a risk to their health.

Moreover, the weather to such harsh places is unpredictable and seamen are to have in mind the worst-case scenario so as to act and at the end be, the safest possible. Cold-weather clothing has always a special design to the highest standards of quality, so as to provide the best possible protection from cold.

It is therefore essential to be provided and distributed evenly to each and every member of the crew with the perception of something which will save lives and make the work in such environments more operational and should never be a matter of economical discussions from the part of the company.

### **3.4 Hypothermia**



This is a situation in which the body gets exposed to cold weather. It occurs when the temperature of the body goes below 35°C (Islam et al., 2017). Hypothermia is a fatal condition. When a seafarer falls into the water accidentally or is exposed to icy conditions, a deadly state is often reached due to hypothermia.

The average body temperature is maintained by the hypothalamus part of the brain using nerves. This part of the brain contracts and expands the vessels controlling blood flow to maintain and adjust the body's temperature. Nevertheless, if the body gets exposed to freezing temperatures, the body temperature will be unable to return the temperature to normal, hence hypothermia.

Conditions such as hypothermia are a common problem that the crewmen face due to a lack of protective clothing.

Many seamen may lack adequate and appropriate cold weather attires to safeguard them against extreme cold weather situations that affect their health and wellbeing as they voyage long journeys in ship vessels (Shan, 2020).

Although hypothermia is not something only seamen may face, there is a great deal of difficulty in this specific sector and that has to be with the lack of medical doctor on board. High cost has been a crucial factor on why there is hardly any doctor on vessels and specifically of those vessels carrying goods. As a result, that obligates the ordinary seaman to have to know the basics if not more of the first aid and medicine there is in the possibility of someone getting hurt or sick on board.

In this way, the job itself becomes more difficult to comprehend and twice as much important on the idea of how much responsibility is involved on the daily life of a seaman.

### **3.5 Slipping and falling injuries**



The seamen at times slip due to the presence of ice or snow, which comes as a result of extreme coldness. Injuries and pain happen, causing discomfort and interruption of the workflow (Islam et al., 2017). Falling is a life-threatening condition and may even lead to other health conditions resulting from the cold during winter. Improper netting or wrong placing of guardrails also leads to overboard injuries. Lack of protective equipment or clothing leads to a high risk of injury.

Slips and falls on ship are not something that you can take lightly as the ship is the least unlikely to brake or bend. On the contrary the most likely event is for the seamen to make a bruise or break a bone at the best-case scenario. Bearing that in mind, the motto “safety first” gains a new meaning and value, as human lives are priceless and some accidents cannot be reversed.

### **3.6 Possible Solutions**



However, the challenges that seamen face can get rid of or minimized through some strategies. *Frostbites*, for instance, can be prevented by wearing protective clothing that covers ears and cheeks fully, using mittens instead of gloves, socks, and liners that fit well, giving full insulation (Shan, 2020). Also, seamen can keep moving to keep the body warm and watch signs of frostbites and find shelter early before the infection gets severe. Besides, it is advisable to seek medication as fast as one notices any sign.

The problem of crewmen lacking *cold-weather clothing* can be solved by providing proper clothing that protects against extreme coldness. When the seamen are on clothes that quickly get wet, their physical effectiveness or ability decreases, resulting in impaired judgment.

*Hypothermia condition* resulting from cold weather is also avoidable by always putting on thermal gears that protect the seamen from coldness (Solberg, 2020). Besides, in cases of abandoning the ship due to an emergency, an immersion suit should be worn, and if one accidentally falls in the water, one should be rescued as fast as possible. The people rescuing the victim must also use thermal protection.

Navigational information concerning seasonal areas and frequency occurrence are essential to crewmen to avoid storms or hurricanes (Dachev & Lazarov, 2019).

Moreover, studying weather reports and faxes that predict or give warnings on weather conditions can also be used by seamen to avoid storms. Another solution is staying away from the storm's path or track. Checking how stable the vessel or ship is before starting the journey is crucial.

Injuries resulting from falling in snow or ice can be prevented in methods such as getting rid of snow and ice from walkways, ensuring safety netting and guardrails

are in the right place to prevent injuries, and remove ice from structures to prevent injuries resulting from falling (Solberg, 2020).

The above information indicates that climate change is opening up business opportunities in the north. Climate change is leading to the melting of the ice cover that prevents sailing. Currently, ships can navigate new routes across the Arctic because of the melting. The new routes have enabled countries such as Russia to reach untapped resources in the area such as oil. Others are taking the advantage of new routes to see the Arctic wildlife such as the polar bears.

However, these routes, due to extreme weather, pose many risks. There are several problems that seamen face due to cold weather, especially during winter when extremely cold. The challenges include storms and hurricanes, health conditions like fatal hypothermia and frostbites. Also, falling and getting from ice is an issue that the seafarers go through. Wearing protective clothing is the chief method to solve these issues. Seeking medication after getting hurt or bites by insects is also essential. However, these routes, due to extreme weather, pose many risks. For example, poor utilization of equipment such as clothing and life safer may lead to health problems such as the development of frostbite and respiratory diseases. The health risks may lead to job loss among the sea workers due to their low productivity.

#### **4. Conclusion**

After taking all the above statements into consideration we can all agree that a seaman's life is full of unpredicted risks. The security risks that I have analyzed through my research are some of the many a seaman may come across throughout his carrier and must be the most psychologically trained to face. The job is not easy and through my 2 embarkations and 4 years of studying at the academy I have come to the conclusion that the knowledge provided is indeed important but not fully enough to cover the vast spectrum of risks and works needed on ship. It is a combination of intelligence, emotional strength, willingness, thoughtfulness, quick action taking, listening, leader skills, work ethic etc. It is not easy to succeed in this job. Every day is a new challenge and an unknown path you are to take.

Luck although somehow useful cannot be the beacon to someone's decision of continuing this carrier. There is no trusting your gut scenario when lives and a million-dollar cargo are at stake. There's a constant need for learning new skills and implementing them every day on ship.

Is it a job that provides a good amount of money? Most definitely! But one must also consider that great possibility comes along with great power. Looks can be deceiving. After all, if you want a comfortable journey you should reduce the luggage of expectation. Security risks were and always will be a topic to be discussed and improved. Human errors account for two thirds of all accidents at sea and for that we conclude that awareness on security risks should be our first priority.



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