JOURNAL OF MARITIME RESEARCH

Vol XIX. No. I (2022) pp 59–67

ISSN: 1697-4840, www.jmr.unican.es

Evolution of working and living conditions on board ships

Amanda Peña Navarro[1,*]

ARTICLE INFO

Article history:
Received 12 Feb 2022;
in revised from 27 Feb 2022;
accepted 4 Mar 2022.

Keywords:
safety, living conditions, working conditions, merchant shipping.

ABSTRACT

The maritime environment is a complicated and often misunderstood environment. When it comes to approaching an issue related to the maritime labor environment, it must be borne in mind that the Sea is an international environment, and as such, it is subject to a series of international standards that all countries must comply with. The working and living conditions of all seafarers is an essential issue for them, either from the point of view of personal safety, ergonomics, comfort, salary agreements, etc., but also these working conditions can have an impact on a Directly on Safety, not only at the level of the Ship in which it is sailing but also of the environmental environment in which it is located.

1. Introduction.

Maritime navigation goes back much further than we can imagine. Like any other transport and propulsion system, maritime navigation has evolved, and with it the living conditions on board have evolved. This is the subject of this article.

As we have said, as shipping has evolved, so have the working and living conditions on board. The working conditions of merchant seafarers on board are intrinsically linked to the environment in which we live, and which is daily associated with stress, fatigue and the consequent fatigue associated with it, and we see it as something normal when it should not be so.

The marine environment is a complicated working environment due to many factors. On the one hand, the merchant seafarer is in a closed ecosystem, which does not allow for continuous communication with the outside world and which gets stale very quickly. Another of the factors that makes this environment complicated is the fact that, as we mentioned, being in a closed ecosystem, the delimitation of work and rest schedules is sometimes blurred. In other words, separating work from personal life while the seafarer is at sea is practically impossible.

Furthermore, it is an environment in which the fatigue caused by the prolonged feeling of always working and not having enough time to disconnect often leads to fatigue, one of the main causes of maritime accidents in the world.

From all that we have mentioned above we can extract the objective of this article, which we are going to develop in the following section of this paper.

2. Objectives.

The general objective of this article is to analyse how living conditions on board ships have evolved as navigation systems have evolved.

We have achieved this objective by reviewing the literature on the historical evolution of working and living conditions on board ships. We will take a brief look at the living and working conditions on board sailing ships, which was the first navigation system we encountered. We will continue with the working and living conditions on board steam-powered ships, which was the second major milestone in the evolution of navigation. And finally, and as a conclusion, we will study the working and living conditions on board ships powered by internal combustion engines.

[1]Departamento de Ingeniería Agraria, Náutica, Civil y Marítima. Universidad de La Laguna.

*Corresponding author: Amanda Peña Navarro. E-mail Address: apenanav@ull.edu.es.

3. Background.

The analysis of the evolution of working conditions on board merchant ships is as necessary as it is obvious, insofar as there has also been an evolution in navigation systems which has led to changes in some of these working conditions.

The evolution of working conditions has been linked to the evolution of shipping itself, as with the introduction of technological improvements, such as autopilots or improvements in working conditions regulated by legislation, both international and national.

First came the sailing ships, then in the modern age the steamships and finally with the industrial revolution came the modern ships, powered by internal combustion engines.

In order to explain the evolution of working conditions and how they have changed to what we know today, we will take a short tour through the evolution of maritime navigation and see what significant changes have occurred in working conditions, following the evolution of propulsion systems themselves, starting with sailing ships, continuing with steam engine ships and ending with ships powered by internal combustion engines.

As civilisations advance, new discoveries are made and some of them are applied to many areas of life and also in navigation. In the case of sailing, some of the improvements that have taken place and that we can continue to see evolving today are the use of new fabrics for the manufacture of various types of sails, the evolution in the designs and mechanisms of the different rudders, etc.

With the progress and improvements in sailing that we have mentioned, it would be understood that the conditions of the workers on board could improve with them, but on some occasions this was not the case.

Throughout history we can find numerous records of the various civilisations that have used sailing for different purposes. One of the earliest known records of navigation, and specifically sailing, can be found in the Mesopotamian peoples or the Sumerian people. Sailing was used to move between settlements along the Tigris and Euphrates rivers or along the Mediterranean coast to trade all kinds of goods. [3]

The Egyptian people, as well as by the Phoenician people, also developed a great deal of maritime activity along the Mediterranean. The Phoenicians lived a sea-driven life and therefore saw the need to perfect their navigation systems. They used ships and navigation for various purposes, mainly for trade and warfare.

There are also numerous known records of sailing by the Romans and Greeks, who also used their ships extensively for trade and warfare.

Another of the peoples who lived facing the sea were the Vikings, who used their ships to conquer and ravage the lands in their path. [4]

The common characteristics of all the ships used by the civilisations mentioned above are the propulsion systems, through the use of sails and oars. The sails changed shape, from the square sail used by the Egyptians, to the triangular Latin sail, which allowed them to sail with a wind that was not necessarily from astern. [5]

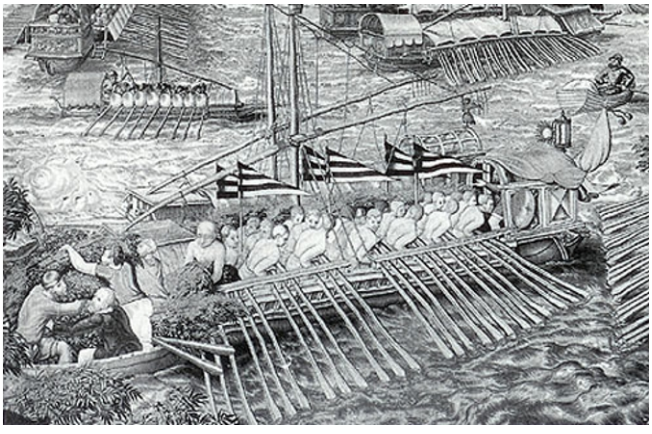
The great disadvantage of sailing was that it depended exclusively on the presence of wind. Because of this, oars were the alternative propulsion system when weather conditions did not permit sailing under sail. As ships became larger and larger in size, the number of oars and, consequently, the number of rowers needed to keep the ship sailing increased. [3]

Figure 1: Egyptian sailing vessel.

Source: historiaeweb.com.

Historical films, such as Ben Hur, depict events that are not entirely real. These films show how sailing ships were propelled by slaves, who were often whipped and lashed on the benches, with no possibility to wash themselves. This was not really the case, at least not in the time of the Egyptians, Romans or Phoenicians. It was usual on these ships for the oarsmen to be men, usually peasants or humble people without a trade, who were paid a wage for their work. They were free men. [6]

Figure 2: Galley oarsmen known as ”rabble”.



Source: medipiratas.wordpress.com.

As in all situations in life, there were exceptional cases, in which a prisoner was given the opportunity to commute his sentence for years of service in a galley as an oarsman, although this was not the norm. Finding slaves or convicts as oarsmen

became normalised from the Middle Ages onwards. Spain was not an isolated case and thus, during the reign of Charles V, it was common to find this figure on Spanish galleys, as it was also found on ships of the English and Italian navies. [7]

In these galleys there were different levels of hierarchy or status. If we were to draw a pyramid to show the ranks we would find, starting at the highest point, the captain, then the officers, then the seamen and finally the ”rabble”. The ”rabble” was the name given to the group of rowers who embarked on the galleys. Within the rabble, or oarsmen, there were different types: galley slaves, slaves and good buoys.[8]

Of these groups, the galley slaves were forced rowers, those rowers who commuted their sentence as mentioned above. They usually commuted their sentences to avoid death sentences, amputation or to avoid physical punishment. The conditions under which these rowers worked were inhumane. To prevent escape or desertion, these prisoners were chained to the bench on which they had to row. They could only move within a metre and a half of the length of the chain that held them in place. In this space they had to eat, sleep, wash themselves (or what was considered at the time to be washed), and even relieve themselves. ”The soldiers in the galley used to wear handkerchiefs dipped in perfume on their faces in order to be able to stand the smell” [8]. It was also easy to tell when a galley was approaching by the smell that preceded it. The food these rowers received was of the same quality as their working conditions, poor. It consisted of a piece of hard, baked and hardened bread, which they called bizcochos, a ration of stew and a ration of water. The lack of hygiene and the poor preservation of water and food led to illness and/or death. Toileting consisted of dry cleaning, that is, washing one’s face with a little water or rubbing it with a cloth or the shirt itself to remove sweat. In addition, it was also common at this time for there to be pandemics due to a lack of hygiene, and to prevent lice, for example, rowers were shaved. Ulcers caused by chains were treated with a wide variety of ointments, which were dubiously effective. [8]

Within the group of oarsmen, slaves were the scarcest and were perfectly catalogued, as if they were an object. Slaves were a highly prized commodity at the time and, as considered goods, the number of slaves on board was detailed and recorded, and their most characteristic features, such as whether they had scars or thick lips, for example, were described. The conditions of cleanliness and food were the same as those of the galley slaves mentioned above. [7]

The last group of oarsmen were the so-called ”good buoyers”. The job of good buoy was not considered dishonourable, however, this changed with the incorporation of galley slaves and slaves into the ranks of the rowers. The ”good buoyers” were either volunteer oarsmen or galley slaves (those mentioned above) who, once their years of service were over, were reenlisted as volunteer oarsmen in exchange for a salary. In addition to their wages, these oarsmen received a food ration called a cabo, which consisted of salted meat, fresh meat, sponge cake, oil and water. It also included a ration of wine, which was considered almost more important than water. [8]

Despite the fact that the rabble consisted mostly of slaves and galley slaves, and the scarcity of good buoys, other methods of recruitment were sometimes used in order to fill all the places for oarsmen needed on board. One of these dubious recruitment methods was the so-called ”gold coin game”. This game consisted of ”supposedly” drawing lots for a gold coin. Those interested in participating in this game would sign up on the lottery list without knowing that they were secretly signing a 10-year contract to become galley oarsmen. [10]

Figure 3: ”Leva” brigade.

Source: lavozdegalicia.es.

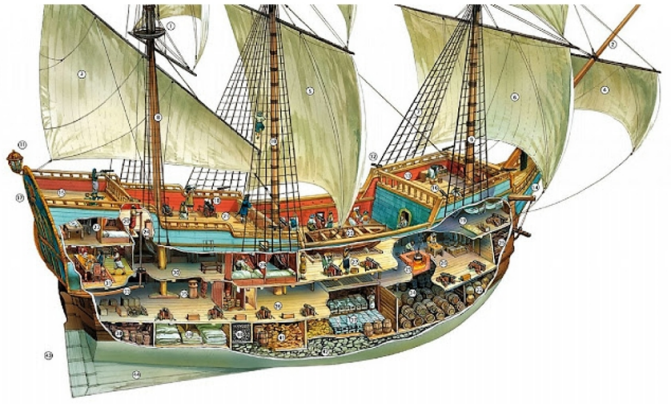
As we moved up the ranks and saw what life was like for seamen, working and living conditions improved. At times the methods of recruiting seamen were also questionable as, when there was a shortage of seamen, forced recruitment methods could be used. In particular, we are going to talk about a method called ”forced conscription”, a system by which men were ”conscripted” in the port when they were drunk. They were put on the ship without them realising it when they were drunk and set sail. Once they were on the open sea, they had to abide by the law of the sea, i.e. they automatically became sailors in the service of the crown.

There were also what were called ”levy brigades” that used force to recruit men, mainly young and inexperienced, to enter the marines in the service of the crown. [10]

This practice was common when there was a shortage of seamen. The reality of the living conditions of these crewmen was somewhat better than those reported for the oarsmen who were in chains. However, they also left much to be desired in terms of living conditions.

The interior space of these sailing ships was low, with few openings to the outside for ventilation or light. After dark or in bad weather, all the hatches were closed and the oil lamps were lit. These lamps contained the greatest danger a wooden boat could have, fire. In addition to the entire crew, the holds of the sailing ships also housed horses, pigs, cows, water and food supplies, as well as ammunition and countless boxes. In short, this type of vessel was overcrowded, with most of the crew crammed in the crowded between-decks in a dark, stuffy and dirty space. In the lowest part, the bilge, deck water ran down to accumulate in this area, which had to be cleaned frequently. It caused foul odours and was a continuous source of infection due to the heat, poor ventilation and accumulation of rubbish or dead rats. [11]

Figure 4: Spanish galleon of about 1,000 tons and two decks during the 16th century, distribution of spaces.



Source: Peter Dennis.

The men slept in hammocks hanging from the ceiling. The floor was always wet. As mentioned above, there was no light, ventilation, cleanliness of the hammocks, or cleanliness of the space in the crew's sleeping area. The latrines for the seamen were located in the bow (called beques, wood with holes in it). The officer's quarters had covered latrines at the stern. [10]

Body hygiene was limited to shaving once a week, combing one's hair every day to remove parasites, washing one's feet "often", changing one's shirt twice a week, and hammocks had to be washed on arrival at each port. It was understandable that the lack of drinking water for washing and washing clothes meant that many did not comply with these measures. [11]

Another curious element in the internal layout of the ship was that the galley and sanitary area were located next to the livestock.

Finally, at the top of the pyramid, we find the captain and officers, who were usually appointed by the crown. They were assigned the ship and asked to recruit the crew. The greater the renown and prestige of the captain, the easier it was for them to find crew and the less necessary was the use of forced levy or levy brigades. [8]

The living conditions of the captain and officers were no comparison to those of the rest of the crew. The captain had a chamber of his own, in which there were a few chairs and stools, a bed with clean sheets and even a pillow. Of course the toilet was separate from the rest of the seamen and officers. [8]

From the regulation of 1st january 1786 onwards, disinfections were introduced on ships and ventilation and sanitation measures were imposed to keep most areas of the ship dry. [10]

All these conditions would improve substantially in some respects with the advent of steam navigation.

As far as this article is concerned, the industrial revolution brought one of the great milestones for the maritime sector, the incorporation of the steam engine as a propulsion system.

Steam navigation was not exempt from the dangers of being at the mercy of the winds or the inclemency of the sea. The voyages had no fixed or foreseeable duration and the working days were extremely long, as the boiler had to be kept constantly fed. On many occasions these vessels were not characterised by their safety, leading to innumerable sinkings. [13]

When we speak of steamships we think of big ships with big chimneys, spitting smoke and making a thunderous noise. Well, that was the reality in the early days. The first steamships consisted of a steam boiler, a steam turbine and a water-cooled condenser. The circuit is simple, water is heated and when it evaporates it expands and moves the piston alternately generating the necessary movement to move the propeller and thus achieve the desired thrust.

All this revolution made it necessary to find sufficiently qualified personnel to be able to carry out the necessary activities to make these machines work. With the creation of steam engines, the figure of machinists was born, personnel with a much higher technical qualification than had hitherto been required of oarsmen or other personnel on board. Before the appearance of steamships, the crew members with technical qualifications, and there were only a few of them, were those in charge of navigation, the captain and officers. Machinists were today's equivalent of our officers and chief engineer officers, experts in the maintenance and operation of the propulsion systems carried by the ship. [14]

The appearance of the steam engine facilitated the movement of goods and passengers in less time. As far as working conditions were concerned, we can say that they were neither the best nor the most suitable.

As we mentioned earlier in the section on the Titanic, with the steam engine a term was coined to refer to the workers on the engines, "the black crews". This name comes from the dusty, black appearance of the workers who worked on these machines. In order for the machine to work, water had to be heated in the boiler. This water was heated by means of coal that was shovelled into the boilers. This was one of the tasks of these workers and caused them to be covered with a layer of soot, staining their skin and clothes. [2]

Figure 5: "Black gang".

Source: Jorge Olier.

The engine rooms were dingy, poorly ventilated and very hot. Much of the floor space was taken up by the machines themselves, which meant that the space available for the operators was scarce. [15]

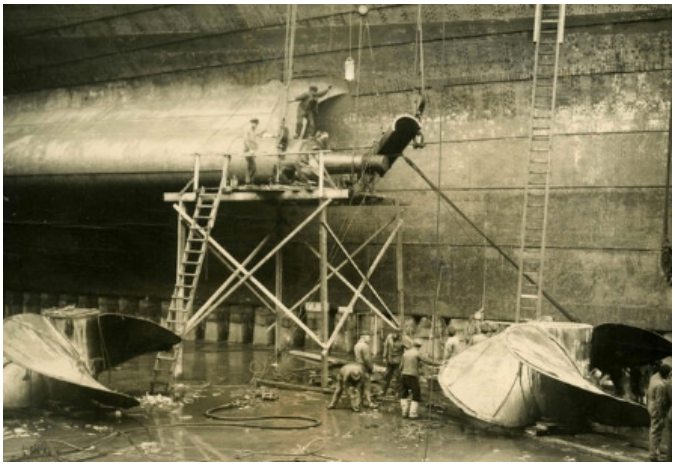
The physical work performed by the machinists was intense

and heavy, as they had to be continually bending their backs and loading and shovelling coal to supply the machine. The high temperatures generated by the boilers when heating the coal and the almost non-existent ventilation meant that the workers suffered from respiratory problems. They were also exposed to deafening noise due to the close proximity to the machines, which caused them to suffer from hearing problems over time. Due to the high temperatures reached by the boilers, workers were exposed to significant burns. [15]

Although we have not mentioned it so far, since the beginning of steamships, the vibrations produced by the engines were perceived during navigation. The continuous perception of vibrations, together with the fatigue produced by the physical work shovelling coal and poor breathing caused by the absence of ventilation, generated fatigue in the engine drivers, and if we add to this the high temperatures in the engine room and the vibrations, it is clear that these men were susceptible to other long-term problems.

With the incorporation of the propeller as a propulsion mechanism, the speed increased, which led to a progressive decrease in the duration of the voyages. [12]

Figure 6: Changing the propellers of a giant ship.



Source: alamy.es.

In the design and construction of ships powered by steam engines, a rest area was also created, with some cabins hidden from the rest of the passengers travelling on the ship, for the rest and cleaning of the engine crews. [2]

Once again we can see that with the change from steam ships to ships with internal combustion engines there was a great change both in terms of navigation and in terms of life on board for the crew, making it possible to reduce voyage times, at the same time as saving on costs and crew on board and, lastly, improving conditions on board with constructive designs and international regulations.

As mentioned in the previous section, the change from steamships to ships with internal combustion engines meant a great change both in terms of navigation and in terms of life on board for the crew, making it possible to reduce sailing times, at the same time as saving on costs and crew on board and, lastly, to improve conditions on board with constructive designs and international regulations.

The change from the steam engine to ships powered by internal combustion engines, which was a revolution, meant substantial changes in shipbuilding from this time onwards in order to adapt to the new requirements of the diesel engine and its navigation system. Ship designs began to take into account, for example, that the engine weighed half as much as the steam engine, that the fuel weighed a quarter as much as coal and that it did not need the same amount of drinking water as its predecessor, also reducing its weight.[1] The new engine was also the same as its predecessor.

The design of the hull architecture is transformed. As the ship's power increased and the water moved faster, in order to prevent the deck from getting wet, the topsides had to be raised, where concave shapes were also incorporated into the truss design (instead of the traditional straight lines), in order to deflect the spray of the waves away from the ship. [1]

Another consequence of the use of internal combustion ships has to do with the crew. With the increasing introduction of new technologies and the use of fuels that supply the engine automatically, as well as electronics and computers in many processes and activities, the number of crew required for their operations is decreasing.

The evolution of propulsion systems, and especially in this chapter internal combustion engines, should have implied an evolution of working and living conditions as the different changes have taken place. However, with the creation of the IMO and its opinions, conditions on board ships started to be more strictly regulated. The aforementioned change in ship structures gives way to the search for comfort and convenience as far as possible for the crew members on board ships.

The IMO obliges its member states to comply with a number of safety and welfare requirements on board ships, all of which are listed on its website. Working shifts, working conditions and the comfort of certain types of work are some of the issues that the IMO regulates in order to avoid accidents. Each of these rules has to be ratified by each member state in its legislation. In the case of Spain, it is ratified by means of an instrument of ratification. [17]

As there are so many rules and it is so difficult to update them, it was decided to try to gather in one single rule everything related to the rights of maritime workers, without leaving aside the shipowners and their economic interests.

4. Material and methods.

The material used has been the articles from which the information has been extracted in order to be able to see the evolution of the subject we are dealing with. Once the information has been extracted, we have set out the information in such a way as to allow the reader to understand the evolution of this subject.

The method used for the preparation of this article has been a systematic review in order to provide an answer to the subject we want to deal with, which is how living conditions on board

ships have evolved. We have carried out a bibliographic search in different sources, both national and international. For this we have used different databases to which we have access from the Q point of the Library of the University of La Laguna.

5. Results and analysis.

The activity carried out by seafarers takes place in an international environment and, for this reason, their personnel must simultaneously comply with the legislation of their own country and international legislation. In this section we would like to discuss what these rules are and how they are regulated by different international organisations (IMO, ILO, WHO), to be subsequently incorporated into each country's own regulations.

Working conditions on ships refer, among other issues, to the minimum safety manning on board, categories and positions of personnel on board, functions, training, working hours, watch and rest periods, as well as their duration, occupational risk prevention, etc. However, given that in the marine environment both the place of work and the place of rest and life outside working hours are intermingled in the same physical environment, we must also take into account the living conditions, i.e. accommodation, hygiene and health conditions, as well as food and leisure.

INTERNATIONAL REGULATIONS. We will start by talking about the most important document at international level for the maritime sector, the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers. This document contains everything related to standards of training, certification and watchkeeping for seafarers, as its name suggests, which was approved in 1978 by the IMO. It came into force on 28 April 1984 and since then modifications have been made to some specific aspects in order to adapt its contents to the reality of new technological and operational requirements. [18]

The STCW Convention is divided into two parts: the STCW Training Convention and the STCW Training Code. The Training Convention part consists of the original seventeen articles that were signed in 1978, followed by the annexes with the amendments agreed in the successive updates of 1995 and 2010. For its part, the Training Code has the updates document and two headings, one containing the mandatory part of the Convention for the countries that subscribe to it and the other containing the provisions of a recommendatory nature. [18]

The training code is where the functions of each of the professional categories are regulated and for each of them, what the competence is, how it is acquired, what methods can be used to demonstrate it, as well as the criteria for assessing that the competence has been acquired. Chapter II sets out the specific duties and competencies for training, seagoing time and specific competencies for deck crew, while Chapter III sets out the duties and competencies for engine crew. Common criteria are laid down for the personnel of both sections with regard to requirements in terms of number of months of seagoing service, formal training and education. However, for the deck section, the data relating to the gross tonnage of the ships to which they are assigned shall be considered, specifying whether they are ships of 500 GT or more, or of 3000 GT or more, while for the engine section the requirements shall be measured in terms of the main propulsion machinery and its developed power, the power ranges being measured at 750 KW or more or 3000 KW or more. [18]

In the table above we can see an example of how each of the functions to be performed are defined in the training code.

We will now turn to those agreements adopted by the ILO that seem to us to be most relevant to our subject matter.

One of the most important factors in terms of working conditions concerns working hours and rest periods. The ILO adopted Convention C180 "Hours of Work on Board and Manning of Ships Convention 1996". In summary, it states that the maximum number of working hours shall not exceed 14 hours for 24-hour periods, 72 hours for one-week periods. Rest periods are regulated, which may not be less than 10 hours for a 24-hour period and 77 hours for a one-week period. [19]

The $164^{t}h$ ILO Convention "Convention on the Protection of the Health and Medical Care of Seafarers, 1987", ratified by Spain and in force since 3 July 1991, establishes various provisions on medical and sanitary personnel on board, medical premises and infirmaries on ships according to their category, the clinical documentation to be used by those in charge and the health training of the crew. [20]

The first convention on ship's crew accommodation conditions was in 1949, with ILO Convention C092. This convention has been followed by other updates, but these have improved and modernised what was already contained in the original document. This standard establishes all the considerations to be taken into account when designing a ship. It determines that the layout of the cabins should preferably be in the central part of the ship or in the stern if necessary, with adequate lighting and ventilation, with the use of materials that allow easy cleaning and painting if necessary and with bulkheads that do not allow parasites to nest, as well as fixed furniture elements and anti-vibration and anti-noise systems. It regulates in detail the rules that have to do with health and safety in relation to the spaces. [21]

The environmental risks of air, noise and vibration in the workplace are covered by Convention No. 148, approved by the ILO on 24 November 1980, as well as establishing a series of recommendations for the protection of workers. [22]

For its part, the I.W.O. incorporated the study of noise levels on board, publishing Resolution MSC.337 (91), which was later modified.

But not everything that is approved as a standard is accepted as good by everyone. An example of this is the technical article published by the naval engineer Publio Beltrán, with more than 37 years of experience as a consultant in the sector for the supervision of noise and vibration problems, in which he describes the disadvantages he sees in IMO standard MSC 337 (91), considering it obsolete and predicting that seafarers will continue to suffer deafness problems with the proposed measures. [23]

We would like to speak finally about IMO Resolution A.1047 (27) adopted on 30 November 2011 setting out the principles relating to minimum safe manning, considering all operational

Table 1: Example of competence in the STCW Convention.

Competence	Knowledge, understanding and sufficiency	Methods of demonstrating competence	Competence assessment criteria
Planning and leading a voyage and determining the situation	Astronomical navigation Ability to determine ship's position using celestial bodies Land and coastal navigation Ability to determine vessel location using: 1. Land marks 2. Navigational aids, including lighthouses, beacons and buoys 3. Estimate navigation, taking into account winds, tides, currents and estimated speed; Thorough knowledge of, and ability to use, nautical charts and publishing, such as charts, tide tables, notices to skippers, nautical warnings and maritime traffic organisation information. Electronic navigational status determination systems. Capability to determine the location of the vessel using electronic navigational aids. Echo sounders. Ability to operate these devices and use the information correctly.	Examination and assessment of the results obtained in one or more of the following training modalities: 1. Approved on-the-job experience 2. Approved school ship experience 3. Approved simulator training, if applicable 4. Approved training with laboratory equipment Using: chart catalogues, nautical charts and publications, nautical notices, sextant, azimuthal mirror, electronic navigation equipment, echo sounder, compass	Information obtained from nautical charts and publishing is relevant, interpreted and used appropriately. Potential navigational hazards are accurately identified. The primary method chosen to determine the vessel's situation is the most appropriate in the prevailing circumstances and conditions. The situation is determined with acceptable margins of error due to instrumentation or systems. The reliability of the data obtained by the primary method of location determination is checked at appropriate intervals. calculations and measurements of nautical information are accurate Charts chosen are those of the largest scale for the area being navigated, and charts and publications are corrected to the latest available information. Checks and tests of the operation of navigation systems are in accordance with the manufacturer's recommendations and good seamanship practices.

Source: STCW Convention.

factors, the functions and competencies of each of the posts

In its ANNEX 5 ”Framework for determining minimum safe manning”, which provides the model of how to present a proposal by the Company, the operational functions with all their elements (duration, frequency, competence, importance), operational factors, etc., we will extract the following because of its relevance to our study: ”Capability to perform the task: 1.6 The information obtained after defining the operational factors and functions should be used to determine how many tasks can be performed by a single person under the range of possible operational conditions. Critical considerations at this stage are the human factor constraints and relevant norms and rules. These constraints include sleep and circadian requirements, the physical and mental workload involved in each task, and the limits of exposure to environmental conditions on board, such as noise, temperature and toxins.” [24]

SPANISH REGULATIONS. Spanish regulations are very broad and regulate many aspects related to labour activity, environmental conditions on board, as well as the health and life of seafarers. The following are those that seem most relevant to our research on labour, environmental factors and seafarers' health.

The ILO Maritime Labour Convention was ratified by Spain in accordance with the Instrument of Ratification of the Maritime Labour Convention, 2006, done in Geneva on 23 February 2006 (B.O.E. of 22 January 2013). Due to globalisation and the international transport of goods, the O.I.T. proposes to establish general criteria in the field of maritime transport, to establish at international level, the working conditions as well as the protection of seafarers. [25]

The Workers' Statute, published by RD 2/2015 of 23 October [26], in which all the legal provisions affecting employees working in our country are included.

RD 1561/1995 of 21 September 1995 (B.O.E. of 26 September 1995) [27], contains the provisions on working hours for special jobs. In addition to the marine environment, we find, for example, those relating to air transport and rail transport, among others. On 5 April 2002, Royal Decree 285/2002 was published, amending Royal Decree 1561/1995 of 21 September, on special working days, with regard to work at sea. It establishes a maximum of 12 hours of work per day, 37.5 hours per week (except in cases of force majeure, which may be increased) and the necessary rest between shifts of a minimum of 8 hours (12 if in port) and a weekly rest of 1.5 days. It has two annexes with model tables indicating the organisation of work on board and the second annex contains the model for the collection of data on working hours and rest periods. This standard improves on what had been laid down in ILO Convention 180. [25]

RD Legislative 2/2011 of 5 September (B.O.E. of 20 October) approving the Consolidated Text of the Law on State Ports and the Merchant Navy. This is the main regulatory framework for the regulation of the structure and management of the Spanish port system. The first of the books refers to the port system, the second is dedicated to the Merchant Navy (ship operation, navigation regime, maritime administration, pilotage

service and taxes) and finally, the third book covers the police regime within the ports. [26]

Linked to this State Ports Act, we have to consider as a regulatory framework, the Resolution of the Directorate General of Labour of 13 June 2019 by which the III Collective Agreement of State Ports and Port Authorities is registered and published (B.O.E. of 15 June 2019). In the Resolution of 28 June 2019, errors are corrected and the salary tables by groups are published, the jobs are defined with their functions and the procedures they have to carry out, as well as their evaluation. [27][28]

The following is a list of the most relevant health regulations for workers in the maritime sector.

Royal Decree 504/2011 of 8 April (B.O.E. of 12 May 2011) regulates the structure and functions of the Social Institute of the Merchant Navy. This body will have the competences and functions for the health care of crews, both on board and abroad, maritime health, medical examinations and health information for seafarers and will carry out official medical examinations for maritime embarkation. It also has the task of inspecting and monitoring the health facilities on board ships, including medicine cabinets. It carries out health training programmes in the maritime field, proposing courses throughout Spain. [29]

The minimum conditions on health protection and medical care for seafarers are set out in Royal Decree 258/1999 of 12 February 1999 (B.O.E. of 24 February 1999), subsequently amended by Royal Decree 568/2011 of 20 April 2011 (B.O.E. of 13 May 2011). This protection of health and medical care is based on three fundamental elements: The existence of means of remote medical consultation, the provision of first-aid kits and adequate health training for seafarers and especially for the command staff. [30][31]

We cannot forget Law 31/1995 of 8^{th} november 1995, on the Prevention of Occupational Risks (B.O.E. of 10 November 1995), whose main objective is the promotion of health and safety, regulating the right of workers to health surveillance. [32]

The first convention on conditions in ship's crew accommodation was in 1949, with convention C092, with subsequent updates. Spain incorporates into its regulatory framework and within a compendium of subjects, how the spaces destined for sleeping rooms, dining rooms, recreation rooms and corridors destined for the crew should be. [33]

In relation to the environmental risks of air, noise and vibrations, Spain ratified ILO Convention 148 on the working environment (B.O.E. of 30th of december 1981). In this document, general provisions are established, as well as prevention measures to be observed by companies and workers, and a last part with the application measures and the supervision of compliance with them.[34] For the measurements of these noise and vibrations, Spain ratified Convention 148.

For the measurements of these noise and vibrations on board, we must turn to the document by which Spain incorporates the "Code on noise levels on board ships, adopted in London on 30 November 2012 by Resolution MSC.337(91)" [35], published in BOE number 81 of 4^{th} april 2015. [36]

Conclusions.

The evolution of living conditions on board has been linked to the evolution of propulsion systems. Throughout the article we have seen that living conditions have improved substantially from the first propulsion systems to the most modern propulsion systems.

However, we see that there is always room for improvement, offering a better quality of life for seafarers.

All these improvements have to be regulated, so that all countries have a guideline for minimum standards of comfort. As with everything, there is always room for improvement. That is why the IMO is continuously working on these improvements, looking at the shortcomings and trying to remedy them so that, in an already difficult environment, life is as comfortable as possible.

References.

[1] Mateo, J. A. (2018). De la vela al vapor, del vapor al motor. Las transiciones en la propulsión de la navegación ultramarina en Argentina (1921-1966). Sophia Austral, 22, 183–207. https://doi.org/10.4067/s0719-56052018000200183.
[2] Olier, Jorge. "La historia del Titanic y los Grandes Transatlánticos". ISBN ebook: 978-84-686-0535-7. Editor Bulbok Publishing S.L.
[3] Artículo sobre los barcos en el antiguo Egipto escrito por María González Leer más. (2015, octubre 9). HISTORIAE. https://historiaeweb.com/2015/10/09/las-embarcaciones-en-el--antiguo-egipto/
[4] Los drakkar, los barcos vikingos (historia para niños). (s/f). Historiadelascivilizaciones.com. http://www.historiadelascivilizaciones.com/2011/03/los-drakkar-los-barcos-vikingos.html
[5] Babor, T. a. (2005, septiembre 29). Evolución histórica de la vela. Todo a babor; Todo a babor. Historia naval. https://www.todoababor.es/articulos/ev-vela.htm.
[6] Grijalvo, J. M. (s/f). Juan Manuel Grijalvo - La galera de Ben Hur (versión light). Grijalvo.com. Recuperado el 27 de diciembre de 2021, de https://www.grijalvo.com/articulos/kbenhurl.htm.
[7] Villatoro, M. P. (2019, agosto 28). La tragedia de los remeros: los criminales que impulsaban las galeras del Imperio español. ABC.es. https://www.abc.es/historia/abci-tragedia-remeros-criminales-impulsaban-galeras-imperio-espanol-201908-280101_noticia.html
[8] Poyato, J. C. (2018, julio 11). ¿Cómo era vivir en galeras? La Vanguardia. https://www.lavanguardia.com/historiayvida/edad-moderna/20180702/47311093916/como-era-vivir-en-galeras.html.
[9] de MediPiratas, V. T. las E. (2014, octubre 27). ¿Qué tiene que ver «la chusma» con los piratas? MediPiratas. https://medipiratas.wordpress.com/2014/10/27/terminos-navales-chusma.
[10] Naval, M. (2017, enero 29). El reclutamiento de la marinería. La Voz de Galicia. https://www.lavozdegalicia.es/noticia/ferrol-/ferrol/2017/01/29/reclutamiento-marineria/0003_201701F29C-11991.htm.
[11] Chinchilla, P. L. (2019, marzo 23). Chusma. Armadainvencible.org. https://www.armadainvencible.org/la-chusma/.

[12] Valdaliso, J. M. (s/f). LA TRANSICIÓN DE LA VELA AL VAPOR EN LA FLOTA MERCANTE ESPAÑOLA: CAMBIO TÉCNICO Y ESTRATEGIA EMPRESARIAL. Uc3m.es. https://e-archivo.uc3m.es/bitstream/handle/10016/1880/RHE --1992-X-1-Valdaliso.pdf?sequence=1.

[13] De la vela al vapor - Oficios tradicionales - Oficios tradicionales. (s/f). ORAIN Gipuzkoa. https://www.gipuzkoa.eus/es-/web/aintzinako-lanbideak/vela-vapor.

[14] Los primeros maquinistas navales - Oficios tradicionales - Oficios tradicionales. (s/f). ORAIN Gipuzkoa. https://www.gipuzkoa.eus/es/web/aintzinako-lanbideak/primeros-maquinistas-navales.

[15] http://www.semm.org/anton2p.html.

[16] Https://www.alamy.es/.

[17] https://www.imo.org/.

[18] Convenio STCW, ISBN: 978-92-801-0220-8.

[19] C180 - Convenio sobre las horas de trabajo a bordo y la dotación de los buques, 1996 (núm. 180). Gob.es. Recuperado el 27 de febrero de 2023, de https://www.mitma.gob.es/recursos_-mfom/pdf/C3DE3517-7544-4840-85E3-B79EDF3ECD93/1217-46/CONVENIO180OIT.pdf.

[20] Convenio C164 - Convenio sobre la protección de la salud y la asistencia médica (gente de mar), 1987 (núm. 164). (s/f). Ilo.org. https://www.ilo.org/dyn/normlex/es/f?p=NORMLEX-PUB:12100:0::NO::P12100_ILO_CODE:C164.

[21] Convenio C092 - Convenio sobre el alojamiento de la tripulación (revisado), 1949 (núm. 92). (s/f). Ilo.org. https://www.ilo-.org/dyn/normlex/es/f?p=NORMLEXPUB:12100:0::NO::P1210-0_ILO_CODE:C092.

[22] https://tsisl.es/wp-content/uploads/2019/06/The-New-IMO-.pdf.

[23] https://www.mitma.es/recursos_mfom/pdf/DC7F7BD0-FA-C6-4776-A169-9BBB769E9852/121751/RESOLUCIONA104-727OMITRIPULACIONESMINIMAS.pdf.

[24] BOLETÍN OFICIAL DEL ESTADO. Boe.es. https://www.-boe.es/boe/dias/2013/01/22/pdfs/BOE-A-2013-577.pdf.

[25] MINISTERIO DE TRABAJO. Boe.es. https://www.boe.es-/boe/dias/2002/04/05/pdfs/A13007-13015.pdf

[26] Real Decreto Legislativo 2/2011, de 5 de septiembre, por el que se aprueba el Texto Refundido de la Ley de Puertos del Estado y de la Marina Mercante. Boe.es. https://www.boe.es/buscar-/pdf/2011/BOE-A-2011-16467-consolidado.pdf

[27] BOLETÍN OFICIAL DEL ESTADO. Boe.es. https://www.-boe.es/boe/dias/2019/06/15/pdfs/BOE-A-2019-9021.pdf

[28] BOLETÍN OFICIAL DEL ESTADO. Boe.es. https://www.-boe.es/boe/dias/2019/07/09/pdfs/BOE-A-2019-10162.pdf.

[29] https://www.boe.es/buscar/pdf/2011/BOE-A-2011-8282 --consolidado.pdf.

[30] REAL DECRETO 258/1999, de 12 de febrero, por el que se establecen condiciones mínimas sobre la protección de la salud y la asistencia médica de los trabajadores del mar. Boe.es. https://www.boe.es/boe/dias/1999/02/24/pdfs/A07614-07680.pdf.

[31] https://www.boe.es/boe/dias/2011/05/13/pdfs/BOE-A-2011-8342.pdf.

[32] https://www.boe.es/buscar/pdf/1995/BOE-A-1995-24292-consolidado.pdf.

[33] Ratificación de Convenios de la OIT: Ratificación por España. (s/f). Ilo.org. https://www.ilo.org/dyn/normlex/es/f?p=1000:112-00:0::NO:11200:P11200_COUNTRY_ID:102847.

[34] Convenio C148 - Convenio sobre el medio ambiente de trabajo (contaminación del aire, ruido y vibraciones), 1977 (núm. 148). (s/f). Ilo.org. https://www.ilo.org/dyn/normlex/es/f?p=NO-RMLEXPUB:12100:0::NO:12100:P12100_INSTRUMENT_ID:-312293:NO.

[35] BOE-A-2015-3633 Código sobre niveles de ruido a bordo de los buques, adoptado en Londres el 30 de noviembre de 2012 mediante Resolución MSC.337(91). (s/f). Boe.es. https://www.-boe.es/buscar/doc.php?id=BOE-A-2015-3633.

[36] BOLETÍN OFICIAL DEL ESTADO. Boe.es. https://www.-boe.es/boe/dias/2015/04/04/pdfs/BOE-A-2015-3633.pdf.