

Maritime Automation and the Time It Will Take To Be Implemented Worldwide, For Every Fleet

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Abstract: This article attempts to answer a much-doubted question through a graduate perspective of the present and past scenario of the shipping industry and prediction of time for complete automation of it. Here, considerations made by other technological premonitory personnel, who have predicted that marine transportation as a whole will be completely automated, are reviewed, and also their reasoning is taken forward for a prediction. It also takes various other factors into consideration, such as automation in other industries and how it will affect the automation in the Maritime and Logistics Industry. It mainly focuses on the technology present, and its proliferation and also the technology that is said to be present and implemented in the near future. The predicted time is considering the popularity of the implementation of certain technology. However, a lot of factors that cannot be converted into quantitative data are also taken into considerations, such as time taken by certain legislation to formulate laws to operate in an industry. All the other articles regarding this issue are reviewed, even considering web content made by others on the same.

Keywords: Maritime, Automation, Artificial Intelligence, Maritime vessel

I. INTRODUCTION

Maritime transportation covers ninety percent of the world's shipping and transport. It is the most essential part of world trade. This industry has been going through an extensive automation change with the advent of new technology [1].

Previously, the maritime industry had a lot to be done to maintain a ship that would transport certain goods, such as food crops or livestock. They had separate people onboard, appointed to move the ship, to steer and to maintain the ship and its cargo, and even some to entertain ship's crew. It all started to change with the help of new technology coming in every day. Technology evolved all the way from manual rowing to steam engines to modern large diesel engines. Commercial ships nowadays do not have manual propelling that requires manpower, it rather has an automated propulsion system, not so surprisingly, there is no manual steering as well, heavy ships such as the conventional commercial vessels cannot be steered manually using a steering wheel, automated hydraulic steering systems are rather used. It opened up new possibilities for the industry. Now, the ships can carry refrigerated cargo, they can transport heavy cargo and even some ships that can carry a chassis of another ship, that awaits to be built.

All these changes have brought management systems. The management of cargo and ship is not a problem as there are various sensors for various purposes in each part of the ship. These sensors assist the ship crew to know what is wrong with the ship and able them to rectify the situation. This has significantly reduced the cost of human labor required on ships. Nowadays, to maintain a ship that is almost 30 times larger than the predecessors are maintained by a crew consisting of only 21- 25 people [2]. This is only one of the many benefits that automation brings in this industry. If the automation reaches the point to where it is projected today, that is to be controlled by an Artificial Intelligence (AI) and be fully functional with almost no requirement of any human interface, it can be said that there can be many other benefits, the future of automation can bring us, other than just the reduction in the human labor costs.

We already know that all the other industries have gone through rapid changes in which they have emerged with new technological advancements and fully automated and fully functioning systems, such as automated supply production lines in the automobile industry and automated management systems in the telecom industry. Therefore, it makes it even more necessary for the most necessary industry of Maritime shipping to also go under an automation upgrade [3]. But, how long will it take to have a completely functioning automated Unmanned Maritime seagoing commercial vessel? Answer of this is the main focus of this article.

II. NEW IMPLEMENTATION OF MODERN TECHNOLOGY

It is proposed by various companies that have a big name in this industry such as M/s Wilhelmsen and Kongsberg that they will bring a fully automated vessel, which is electrically powered and electronically operated with the use of Data management, Data analysis, and Information Technology management [1]. As

proposed by many, these upgrades come with an AI brain that will come along with all kinds of sensors that will sense and store data from various environments considering various factors and process them through to take the required action, and for its training, in the premature days, there will be a need of command center that will connect the vessel via satellite communication. In its premature days, it will seek advice from the command centers that will have Information Technology management personnel who will process for new data themselves.

All these seem fairly easy because we already have all the technology needed to achieve it, many companies have come up with model ships for their test run of this automated achievement. It is needless to say that these companies are achieving success but keep in mind that these automation and upgrades are not just for one or two ships that a company will have. It is done for the entire industry. This leads to curious issues and raises a lot of debates covered in various news articles. These mostly circumvent the security, the time it will take to implement all these and the risks of its operation.

III. BENEFITS OF AUTOMATION IN THE MARITIME INDUSTRY

Companies consider reducing human elements in the vessels as data shows most accidents onboard ships are on account of human errors and cannot consider every aspect in a situation to make accurate decisions. These accidents can be far more catastrophic, such as fire onboard, Tanker explosions or Collisions. Prevention of such accidents is necessary to avoid heavy economic loss, and also to reduce the environmental harm these ships have on this planet. Therefore, the human element has to be replaced with something that can compute many aspects at once much faster, to that everyone thinks of Artificial Intelligence.

Apart from reducing human labor costs, by substituting the human element by their machine counterparts, automation can help the corporations in various ways such as reducing operating costs, increased reliability and increased performance. With automation on the rise and the technology already being present to achieve the next generation of Maritime transport vessels, it is not far that there will be a massive change in the entire Maritime Industry. With all other industries using automation as a major tool for its upgrade, the industry of Maritime may suffer a great loss if it stays the same and does not adapt faster [1].

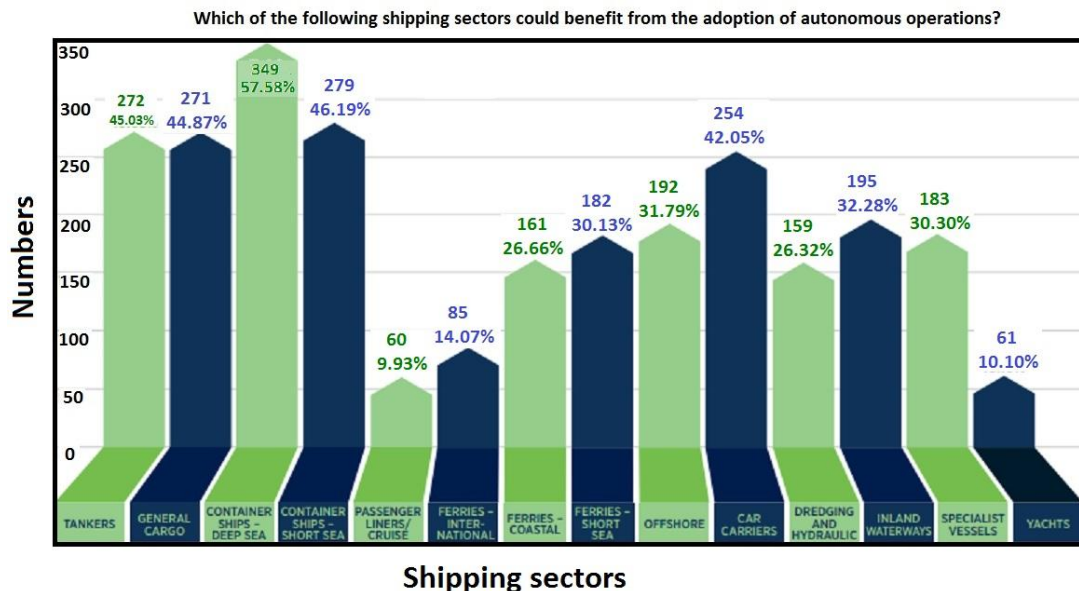


Figure 1: Graph of various sectors of Maritime Industry that will be benefitted by automation [3] (Courtesy safety4sea)

IV. PROBLEMS AND PROPOSED SOLUTIONS

Many argue that this change of automation would eliminate a lot of jobs that humans of today rely on and have a livelihood based on those jobs. The proposal for this in the conference provided by a lot of you tubers is that “automation would bring a lot many jobs on its way than what it might take away”. The key phrases here being “one its way” and “might” here. Since automation in Maritime is fairly in its infancy, it has a long way to go before it gets completely implemented [4].

First and foremost, the time predicted is far near than predicted; now it will all depend on the adaptability of the current working generations with these advancements. As of now this change will be very slow, and will also open jobs for many more to come in the next generation, such as Information Technology

(IT) data Management, and Data analysis, damage control data analysis. Every aspect of the ship that deals with tremendous amounts of data can be transformed into a data management job for the upcoming generations. But as mentioned, this change wouldn't be so fast, and there will still be Masters, and captains and chiefs, and for implementing this change as fast as possible, these people can be given the training of IT management and data analysis that would help them to operate and maintain the ship just by being on deck. This can also kindle a new education degree that combines Marine engineering or Nautical Science with IT management and Data analysis.

Of course, all this can't happen in one day, it is even stated in the conference in Norway that the automation will happen in three stages, and it is in the second stage when the reduction of manual labor costs starts [5]. Here the sailors with sea time experience can learn the IT management and implement the ideas and experiences of their sea time into developing the AI that will run the ship soon. People who also worked as surveyors, engineers and deck officers can share their experience to come up with the best ideas to help develop the features of the upcoming AI. They can share information like, how likely are leaks going to take place during a voyage in the entire hull structure, or information regarding what can go wrong in a certain situation may it arise. There are a lot of operations in the management area that needs human interaction no matter what, assuming such technology has not been developed yet, which can train an AI to maintain itself. This sort of technology would require at least 30 years ahead of today, to function almost impeccably. These operations have a wide variety of tasks such as complex Panama Canal maneuvering, or maneuvering in general with heavy traffic in ports or chipping, painting, mooring, emergency anchoring. All these require human interaction, as there can be large accidents because of misguided maneuvering by the untrained AI [5].

Secondly, the fact that this is initially going to require a lot of capital costs. Some may even say that it can sap the economy of a company. There will indeed be a lot of costs involved, including risks that come along. However, this change can also help the transformation of a company, a very well example of this being Rolls-Royce, they used to have a name for the designer cars in 1906, now has branches operating in various industries, even has a major role in the automation of Maritime Vessels, and also referred to its Marine Power operations Services, Its Controls, and Data Services, and also has partnered with other companies to make the "unmanned ship" a reality in the first place. But with time with the rise of new technology, it is predicted to be cheaper to operate an unmanned vessel [6].

Apart from all these a great risk of cyber-attacks on future systems also exists. All these systems are connected to the internet and are integrated and most obvious would be remotely controlled and monitored from land, thus increasing the risks of cyber-attacks. Even nowadays, the existing systems present in ports get hacked. Therefore, extreme care should be taken while backing this AI system with efficient security [7].

V. HOW LONG WILL IT TAKE?

Not all the technology is present as thought of, many people thought that they would have intelligent AI drones as of now, that will carry works such as, assisting with damage speculation and rectification during an unlikely event on the ship. However, the drone technology is just not there yet. The drones are only capable of providing a satellite feed of any damage that occurred outside the hull structure. Since it will still take time for other industries to come up with smart innovations, the maritime industry will still take time to be fully automated. It is well predicted by many that the future of maritime shipment is very much unmanned (helping drones as mentioned in some of the automated ship advertisements). Sure drones are multi-purpose and have a lot of potentials and are also being used in a lot of other projects, a study indicates how drones became so popular so fast that it is almost fascinating, but one thing is clear, a drone technology that can fly around inspecting and maintaining ships on their own are far from now, that technology is a long term project. Therefore, humans play as those drones in the short term: managing and maintaining the vessel [7, 8].

There are a lot of rules and regulations for the conventional mode of Maritime transport, but none are there for Maritime Automated Surface Ships (MASS) yet [4]. It will take a while for International Maritime Organization (IMO) to formulate laws. However, this law-making would have a strange paradox regarding liability for Marine Insurance Policy, as it would be very uncertain to hold someone or something liable, for example, if an accident takes place in one of such ships, who would be responsible? Would it be the AI, the software engineer of the AI, the hardware engineer of the AI, or the entire company that takes the project to make that certain AI [4]? This is predicted to take about 20 more years. A great point made in the conferences was that these ships will be low-speed vessels, which is understandable as they would need to operate during the training phase with intensive care.

Also, there are a lot of maintenance and test trials that even a conventional ship has to go through, such as fire prevention equipment survey, load line survey and a lot more. These surveys require a surveyor, as of now there are no specified survey grounds for a surveyor to approve the autonomous vessel for its commercial trade. It can be highly doubted that it will bring a sudden and disruptive change.

As of now, there are about 10000 ships currently sailing the seas for commercial purposes, all of them are conventionally made. It will surely not be feasible to reform the existing 10000 vessels to work

autonomously [5, 9]. Projected for 50 years from now, it would require changing the existing architecture, which would undoubtedly require more costs. The more feasible way is to build up new ships from the base, and eventually scrap the old ones [4].

VI. CONCLUSION

According to the data it can be analyzed that it will take more than 40 years to completely achieve an entirely unmanned fleet, operating for the commercial voyage and another 20 years to completely transform conventional shipping to what's in vision. With the venture of M/s Massterly AS, and their proposed launch of the fully autonomous vessel in 2020/21 will give more insight into this prediction, considering its popularity. This will be an eventual replacement rather than a disruptive change, just like it worked in other industries. With the proliferation of new technology at much larger rate, this time period can be reduced. Also, all the governments need to agree on implementing automation as fast as possible, so as to reduce this time even more.

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