

## Role and Challenges of Artificial Intelligence in the Maritime Industry

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### Abstract

The shipping sector occupies a major share of the global economy, this sector is accountable for the transportation of goods from different parts of the world. Shipping sector functions in a complex and challenging environment, where even a small change will result in a significant benefit to the company, nation and society. In order to stay in the competitive world, it is important to invest and implement Artificial Intelligence (AI) solutions. AI helps companies to perform automated tasks, enhance operations, and make quick and better decisions. Artificial Intelligence and Machine learning play a major role in the modern world. The shipping industry is in need of the latest IT-based infrastructure. Shipping companies across the world have to increase their revenue share and also give tough competition to the company which is related and unrelated to the business. This article tries to explain the need for AI and the role it plays in the industry.

**Keywords:** *Automation, Business, Decision and Capability.*

### Introduction

Artificial intelligence (AI) refers to the ability of machines to understand the world around them, learn and make decisions, in a similar way to the human brain. AI will surely play a leading role in the shipping sector. The capability of Machine learning helps the sector to study historical data and predict weather patterns and also to predict the busy and slow

shipping seasons. With help of Automating processes, this sector can identify problems before it occurs.

The application of AI in the manufacturing sector is highly impressive, now AI has been slowly applied in the logistics sector. The application of AI will surely streamline overland transport in the maritime sector. The shipping sector contributes to the globalized

economy, and the expectations from customers across borders have been increasing for the effective use of resources. If AI is properly implemented it will change the marine industry in three aspects – providing self-sufficiency to the automatized entities, assessing the processes and optimizing them, and forecasting future trends. It will surely lead to higher performance and reach sustainability goals very easily

### **Role of AI and ML in shipping**

Information Technology plays a major role in all industries. The maritime business also started to apply Artificial Intelligence and Machine Learning. Machine learning is a branch of artificial intelligence that the maritime industry wants to make use of it for its achievement. Machine learning works with both small and large datasets, it examines the data and compares it to give a uniform pattern, and explores its usefulness. The scope of Artificial intelligence is increasing day by day in all the industry. There is a tendency among common people that Artificial intelligence is a science and engineering-based concept that deals with computers and software. But it is easy to learn and it can be implemented easily.

Shipping companies focus on faster communication which is highly needed in the ships and gives a lot of benefits to the marine engineers and captains, and also to the shipping company. Most of the fleet implemented the remote-control program in their offices, the ship needs high-speed internet, network facilities, and route planners for the captain and crew. So the shipping companies must develop and immediately implement the IT-based infrastructure for achievement in the long term.

Recently shipping companies started investing in Information Technology in order to

improve the standard of vessel operations. The costs involved in the new infrastructure head have to be invested considering the competition in the industry. It will surely help them to improve their business processes. There comes AI and ML for discussion and implementation. Computers will help the mariners to process huge data at a faster rate than humans. ML algorithms will give a great benefit to the ship owners after successful implementation in their business operations. After the investment in AI/ML, the company will yield a lot of benefits in big data analysis competencies. The ML algorithms help the captains to handle the data in the container operation.

### **Artificial intelligence Applications in the shipping sector**

#### **Scheduling**

With the help of Predictive analytics shipping companies optimize the scheduling of vessels. Port authority provides data such as starting place, arrival time, route, and duration helps to manage the trips most efficiently in order to avoid delays and downtimes. Machine learning helps the industry deal with an unexpected situation that arises and enforces route changes. Vessel scheduling depends on various factors, ML is the best way to handle it.

#### **Containers Positioning**

Autonomy to automated equipment is the core function of AI in the maritime industry. AI- optimize the positioning of the container and make the best use of the available space. With the help of computer vision, containers are positioned by unsupervised methods. Size of the container and shape of the container are recognized and appropriate space for the

container will be identified if it's wrongly positioned it will be rearranged immediately.

#### Voyage Planning

Route forecasting is done by the shipping company with the help of real-time data like the weather. It is known to everyone that the incident in the Suez Canal has blocked the entire maritime transport. It has forced shipping companies to find the shortest and most time-effective alternatives. Digital transformation is already implemented in this sector and it requires innovations in route forecasting. AI algorithms consider wave frequency, tides, and winds for forecasting the route. Relying on the limited number of ships is not the most effective strategy for collecting data. data provided by Satellites, also are not highly accurate.

#### Fuel Consumption

The major problem in the logistics sector face is CO2 emissions. The growth of the shipping sector has been increasing tremendously. E-commerce paves way for the AI solutions facilitating route forecasting with fuel consumption and reducing pollution.

#### Autonomous Ships

Machine learning reduces human errors and workforce demand. Automatized processes, enable carriers to save time. Shipping companies have to focus on to automatizing the container vehicles, cranes and other essentials which are used to manage the cargo. Linker's Port Automated driving report published in the year 2021, predicts china is planning to introduce 7000 autonomous container trucks in the ports by 2025. The port authorities have implemented automatized vehicles for loading and offloading the cargo and planned to distribute the containers most effectively to their customers.

#### Predictive Maintenance

The shipping sector and port authorities use machine learning for the purposes of predictive maintenance. Artificial Intelligence helps to identify all the issues related to the machinery before it intensifies, which causes interruptions and affects the whole supply chain. AI also identifies the issues in well advance even before the launch of the route, saving the expenses of ships. Artificial intelligence solutions react at right time, otherwise, they have to rely on traditional preventive measures. This AI solution helps the company by the extend machine life.

#### Dynamic Pricing Algorithm

The revenue-optimal price is estimated by the algorithms by using the demand function. This model incorporates the vessel capacity, fuel prices, sales peaks, supply-chain delays, etc. so logistics is highly recommended.

#### Demand Predictions

The supply chains in the maritime sector are too long so the mistake will be highly costly. It's a must to plan well in advance with predictive algorithms. The correct predictions will save the company from both financial and operational consequences.

#### Natural Language Processing (NLP)

Artificial Intelligence facilitates autonomous shipping and notable innovations, with NLP (natural language processing). Companies started modernizing invoice management by automatizing the information collection, generation of documents, or introducing digital system.

#### Challenges in the shipping industry

1. Shipping Industry is in need of shared data to make high-quality decisions.

Implementation of artificial intelligence (AI) technologies has slowed down due to the quality of data in this sector.

2. Lack of reliable information in the entire supply chain process prevents the development of the industry. So, analytics needs consistent and accurate data.

3. The shipping sector has to implement immediately artificial intelligence, the Internet of things (IoT), sensor technology etc. Employees have to learn the new techniques which are implemented in their workplace.

4 The digitalization procedure will improve the ways of working into smarter, simpler, and more effective. But there will be time limitations and more development costs.

#### Advantages of AI in the shipping industry

1. Accurate past data will help to make valuable business insights after the analytical process.

2. Machine learning competencies will support the investigation of historical data to study weather patterns and predict the busy and slow shipping seasons.

3- With help of AI accidents can be reduced. Threats and other malicious activities can be detected with the help of AI.

4. AI will influence the shipping industry to decide the most effective route. So, the best path will minimize fuel consumption.

#### AI and ML in Stena Lines and Port of Rotterdam

Industries that implemented AI/ML technology had gained a lot in their business activities. One of the world's largest ferry operators Stena Lines implemented AI/ML to bring down the usage of plastic and lessen the accidents in ship movement. It brought down

the fuel expenses and usage of battery-powered power plants in ships. Rotterdam port implemented the ML-based structure to find and inform the arrival of ship time.

It is known to everyone that reliable data is highly needed to reduce uncertainty in shipping. ML algorithms if implemented will help the company and ship to improve their data process which will be highly helpful for the shipowners. Nowadays data mining plays a major role which is very limited in the maritime industry.

The application of ML techniques in the marine sector is a new phenomenon and recently started to implement in all sectors. ML helps the operators to introduce algorithms and also to study the database which helps to solve the major problems in maritime transport. The ways and techniques used in network planning, planning the voyage, optimization of cargo, maintenance procedure, etc. help the business to achieve the expected benefits.

#### Conclusion

Implementation of AI in the maritime industry is not a one-step process and the implantation of AI technology across the fleet has started, but in India, it is still a long way away process. Although it is in the initial and testing stage across borders in many industries. But the initial and commercially viable solutions showed their existence in a few sectors.

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