ARE AUTONOMOUS SHIPPING OPERATIONS LEGALLY LIABLE? A NEW FRAMEWORK OF MARITIME LAW IN THE AGE OF ARTIFICIAL INTELLIGENCE

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ABSTRACT

The emergence of Maritime Autonomous Surface Ships (MASS) that are Artificial Intelligence-enabled is revolutionizing the maritime sector, bringing in more efficiency, safety and cost-effectiveness. Nevertheless, the technological change undermines the current system of maritime liability, which is based on human error, carelessness, and responsibility. In this paper, the insufficiency of the current legal principles to deal with the liability issues caused by autonomous shipping is discussed, especially because of the lack of the human agency, the complexity of AI decision-making, cybersecurity threats, and regulatory gaps. It compares new models of liability such as strict liability, product liability, joint responsibility and approaches through insurance and also brings to the fore the changing role of international regulatory bodies. The paper proposes the reform of the legal framework to include risk-based liability, improved disclosure, and renewed international laws to hold people accountable and equitable in the era of AI-assisted maritime activities.

Introduction

There is a technological revolution in the maritime industry as Artificial Intelligence (AI) is implemented in the shipping process. Maritime Autonomous Surface Ships (MASS) which can operate with less or no human intervention is becoming more of a reality. Although such improvements are efficient, cost-saving and improve safety, there are also new complicated legal issues involved. The legal liability issue is one of the most urgent ones, as it is traditionally based on human error, but nowadays it is being put to the test in the time when the responsibility of making decisions can be passed to the algorithms. [1]

The paper will review the current situation regarding the legal liability in the field of autonomous shipping and will reason why the legal framework should be reorganized to reflect the specificities of AI-driven maritime activities.

The Maritime Liability Traditional Framework.

There has always been a history of maritime law being founded based on the principles of fault based liability, negligence and human responsibility. The obligation of care, seaworthiness and the responsibility of the ship owners and masters are some of the major doctrines that have been in use to regulate the maritime accidents over centuries. The International conventions such as the International Convention on Safety of Life at Sea (SOLAS) and the International Convention on Civil Liability on Oil Pollution Damage (CLC) focus on the subject of human responsibility on the safety of navigation and operations. [2]

In this traditional regime liability is normally attached to:

- Shipowners
- Masters and crew
- Charterers

Manufacturers (in rare instances)

[1] International Maritime Organization, *Regulatory Scoping Exercise for the Use of Maritime Autonomous Surface Ships (MASS)*, IMO Doc. MSC 99/5/1 (2018).
[2] Ringbom, Henrik, "Regulating Autonomous Ships—Concepts, Challenges and Precedents," *Ocean Development & International Law* (2019).

But these categories are blurred when it comes to autonomous shipping in which there can be little or no human intervention at all.

1. The Problems of Self-driving Shipping.

There is lack of Human Agency.

Self-driving vessels are a threat to the roots of the liability on fault. When the AI system is used to make a decision on the way to go, it is hard to pin the blame on a human being. The liability questions which come to mind are should it be the shipowner, the software developer or the manufacturer of the autonomous system. [3]

2. Artificial Intelligence (AI) Decision-Making Complexity.

AI systems, especially machine learning systems, work under complicated algorithms that do not necessarily have complete transparency and predictability. This nature of black box makes it difficult to establish the causation and fault in case of an accident.

3. Cybersecurity Risks

The AVs are very reliant on digital infrastructure, and thus they can be attacked by cyberattacks. The liability in cases of hacking or system manipulations is another legal issue with more complications.

4. Regulatory Gaps

The current maritime international agreements lack the specifics of autonomous shipping. There is a shortage of standardized laws that brings about unpredictability and inconsistency in the sharing of liabilities.

New Strategies on Liability.

1. Strict Liability Regime

A stringent liability model is one of the solutions that have been put forward and under which the shipowner becomes liable irrespective of the fault. This would make the legal process easy

[3] Shaw, Malcolm N., *International Law*, 8th ed. (Cambridge University Press, 2017).

because the victims are compensated without necessarily proving the negligence.

2. Product Liability Model

The other solution is the application of product liability to the autonomous systems. In this model, the manufacturers and software developers may be liable to the accidents that are caused by malfunction of AI systems.

3. Shared Liability Framework

A mixed solution would be more feasible, where all the parties involved in the shipping business (shipowners, operators and technology vendors) share the fault. This model is indicative of autonomous shipping being a collaborative one.

4. Insurance-Based Solutions

The introduction of autonomous insurance plans would be important in addressing the issue of liability. The compliance with the regulatory standards may be indirectly affected by the insurers demanding the compliance with safety standards and technological norms.

International Organization Role.

International Maritime Organization (IMO) has embarked on regulation of MASS by its Regulatory Scoping Exercise. The IMO tries to evaluate the applicability of the current instruments to autonomous ships and define the areas that need to be amended or new guidelines established.

There has to be international collaboration to provide consistency of the legal standards and to avoid the problem of jurisdiction. The lack of a coherent structure may have a negative impact on the international character of maritime trade.[4]

The Requirement to reform the Law.

In order to counter the autonomous shipping, the maritime law should develop in the following ways:

[4] UNCTAD, *Review of Maritime Transport* (2021)

- Redefining Legal Personhood: The issue of whether AI systems deserve some kind of legal personhood should be considered.
- Renewal of Liability Norms: Moving towards risk-based models of liability.
- Improving Transparency: Requiring explainability in the AI systems to support accountability.
- Enhancing Cybersecurity Laws: Developing a set of liability requirements of cybercrime.

Conclusion

The concept of autonomous shipping is a groundbreaking change in the sphere of maritime activities that will essentially undermine the traditional legal principles based on human agency, fault, and negligence. With more and more decisions being made by machines rather than people, the current liability principles do not seem to provide the necessary responsibility allocation, and thus large loopholes appear within the current legal framework.

To overcome these issues, a flexible and dynamic liability regime is needed. A hybrid of stricter liability will help guarantee the timely compensation of victims, product liability will make manufacturers and software developers responsible towards technological failures and shared responsibility model will capture the collaborative aspect of autonomous shipping ecosystems. In conjunction with these strategies, sound insurance structures will be of great importance in risk sharing and compliance in regulations.

Moreover, the proactive legal reform is urgently needed on both national and international levels. It involves revising the current maritime conventions, establishing unambiguous regulatory frameworks of autonomous systems, reinforcing cybersecurity legislation and ensuring transparency and explainability in AI decision-making. International bodies will also be required to be more coordinated so as to bring uniformity and prevent conflicts in jurisdiction.

Lastly, the development of maritime law should be in line with technological advancement to enhance safety, responsibility and promote justice. The future-oriented, adaptable legal system will become instrumental in establishing the trust and sustainability in the fast-evolving world of AI-based maritime activities.