Legal Aspects and Liability Issues Concerning Autonomous Ships

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All sectors of business and industry are transforming into digital society, and maritime sector is not out of the case. But the new thing is the remote control ships or fully automatics ships are becoming a reality.

Remote control ships and autonomous ships will be a tool to reach safety, effectiveness, and economical goal. However, as it intends to take over human element in the maritime industry, the implement of remote control ships or autonomous ships brings new legal issues and liability considerations.

This study aims to highlight some critical legal issues of autonomous ships to reader, but will not try to solve them or give clear answers.

I. The Approach of International Maritime Organization

In order to solve issues from the deployment of autonomous ship, International Maritime Organization Maritime Safety Committee (MSC) has taken first steps to address autonomous ships. In the meeting of MSC 100, the committee approved the process of assessing IMO instruments to see how they may apply to ships with various degrees of autonomy.

For each instrument related to maritime safety and security, and for each degree of autonomy, provisions will be identified when:

- apply to MASS and prevent MASS operations; or
- apply to MASS and do not prevent MASS operations and require no actions; or
- apply to MASS and do not prevent MASS operations but may need to be amended or clarified, and/or may contain gaps; or
- have no application to MASS operations.

The degrees of autonomy identified for the purpose of the scoping exercise are:

- Degree one: Ship with automated processes and decision support: Seafarers are on board to operate and control shipboard systems and functions. Some operations may be automated and at times be unsupervised but the seafarers on board are ready to take control.
- Degree two: Remotely controlled ship with seafarers on board: The ship is controlled and operated from another location. Seafarers are available on board to take control and to operate the shipboard systems and functions.
- Degree three: Remotely controlled ship without seafarers on board: The ship is controlled and operated from another location. There are no seafarers on board.
- Degree four: Fully autonomous ship: The operating system of the ship is able to make decisions and determine actions by itself.

The initial review of instruments under the purview of the Maritime Safety Committee will be conducted during the first half of 2019 by a number of volunteering Member States, with the support of interested international organizations. MSC working group is expected to meet in September 2019 to move forward with the process with the aim of completing the regulatory scoping exercise in 2020.

The list of instruments to be covered in the MSC's scoping exercise for MASS includes those covering safety (International Convention for the Safety of Life at Sea, SOLAS); collision regulations (The International Regulations for Preventing Collisions at Sea, COLREG); loading and stability (International Convention on Load Lines, Load Lines); training of seafarers and fishers (International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, STCW); search and rescue (International Convention on Maritime Search and Rescue, SAR); tonnage measurement (International Convention on Tonnage Measurement of Ships, Tonnage Convention); Safe Containers (International Convention for Safe Containers, CSC); and special trade passenger ship instruments (Special Trade Passenger Ships Agreement, STP).

IMO will also develop guidelines on MASS trial. The guideline include ensuring that such guidelines should be generic and goal-based, and taking a precautionary approach to ensuring the safe, secure and environmentally sound operation of MASS. Interested parties were invited to submit proposals to the next session of the Committee for the future development of the principles.

II. Other Legal issues concerning Autonomous Ships

In March 2017, the (Comité Maritime International, CMI) Working Group on Unmanned Ships circulated a questionnaire. The questionnaire aimed to identify the nature and extent of potential obstacles in the current international legal framework to the introduction to (wholly or partly) unmanned ships. The questionnaire can be summarized into the following legal issues.

1. **The legal definition and registration of the remote control ship and autonomous ship**

   The definition of remote control or autonomous ship is based on the purpose of each individual convention. Current international conventions regulating ships do not generally contain recognized definition of the "Ship" and "Vessel".

   However, due to its geographical feature, countries tend to have different safety requirement for ships; therefore, even the definition of remote control or autonomous ships given by international regulations, may not be accepted by national register of ships.

   For example, according to the reply to the questionnaire from Argentina association of maritime law, Argentina Navigation Act prescribes that in order to register a ship in the Argentine Register, regulatory requirements regarding construction and seaworthiness must be fulfilled. However, there are no rules regarding the registration of remote control ships or autonomous ships, as current act are based on the existence of crew on board. The unmanned ships would not be registered by Argentina Registry of ships.

   At present, the fragmentation of the definition and registration of ships can affect the deployment and application of remote control ships or autonomous ships. Due to the feature of shipping, which is related to the global transportation network, the definition and registration issue had better be solved at international level by International Maritime Organization (IMO).

2. **Legal issue of the seafarer**

International Convention on Standard of Training Certification and Watchkeeping (STCW) 1978 sets minimum qualification standard for masters, officers and watch personnel on seagoing merchant ships and large yachts.

In the sight of replacing human operator on board with machine, will the convention find no application to remotely controlled or autonomous unmanned ships?

The research of CMI points out the maritime law associations of Finland, Panama and United State assume that the STCW convention would likely apply to shore-based personnel as well in excepted circumstances where there is no new specific legislation. And the British maritime law association states that regardless of whether STCW would apply to unmanned operation or not, it is clear that certain provisions on training and competence would not apply to shore-based controller and other personnel. Japanese maritime association also states that although the convention does not find application to a remotely controlled unmanned ship, certain rules requiring watchkeeping officers to be presented may nevertheless arguably be interpreted to render an unmanned ship in breach of STCW and to that extent be applicable to unmanned ships. Therefore the amendment of convention seems inevitable.

Standing on the other side, the Institute of Marine Engineering Science & Technology recommended that pairing human with machine effectively to enhance human intelligence and performance rather than totally replacing human is an area that should not be overlooked. Even if the application of unmanned ships comes in reality, seafarer skill will still remain an essential component in the long term future of the shipping sector. The minimum qualification of masters, officers and watch personnel may not need to be changed.

Human error has been used to create a blame culture towards the workforce at sea, and it also results from poor implementation/ introduction/ preparation for new technology. Many studies show that seafarers are worried about the impact of autonomous ships. If the development of autonomous ships means replacing all the human elements on ships, people who work in marine sector will not accept those novel technologies easily, and this won't lead to a safer future of maritime industry.

3. **Safety requirement of the remote control ship and autonomous ship**

Rule 8 (a) and rule 5 of the international regulation for preventing collisions at sea, 1972(COLREGS) require the operation of ships to comply with the duty of "good seamanship", "proper lookout".

These rules are based on the operation by human, thus, leading to the following two questions:

(1) Would the operation of unmanned ship contrary to the duty of "good seamanship"?

The duty of good seamanship emphasizes the importance of human experiences and judgments in the operation of a vessel, and the adaptability of responses provided by good seamanship. Whether an autonomous ship would be able to reach this level of adaptive judgment would depend on the sophistication of its autonomous system. According to CMI's research, the maritime law associations of countries including Argentina, British, Canada, China, German, Japan and Panama emphasize the requirement that autonomous ship must be at least as safe as ships operated by a qualified crew.

(2) Would the proper lookout sets in rule 5 satisfied by camera and aural censoring equipment?

COLREG rule 5 has two vital elements. First, crew on the bridge should pay attention to everything, not just looking ahead out of the bridge windows but looking all around the vessel, using all senses and all personnel equipment. Second, use all information continuously to assess the situation your vessel is in and the risk of collision.

In this context, if the sensors and transmission equipment are sufficient to enable an appraisal of the information received in a similar manner available as if the controller was on board, then Rule 5 should be considered satisfied.

However, it is unlikely that fully autonomous ship could comply with rule 5. It depends on the sophistication of its autonomous system. If the technology is unlikely at present to provide as equivalent spatial awareness and appreciation of the vessel's positon as there are human on board, then rule 5 would not be considered fulfilled.

4. **Liability**

Liability is an important issue which is frequently mentioned in the area of autonomous ship. According to the study of MUNIN in 2015, liability issue of autonomous ship might arise under the following situations:

(1) Deviation

Suppose a ship was navigating autonomously, and the deviation of the system caused collision damage, how might liability be apportioned between ship-owner and the manufacturers?

According to the research of CMI, 10 maritime law associations stated that under its domestic law, the third party may have a claim against the manufactures. (British, Canada, China, Croatia, Dutch, French, Germany, Italy, Spain, Malta) They may do so in tort if negligence on the part of manufacturers can be proved and if this can be shown to be causative of the damage. In European Union, third parties may also claim under Council Directive 85/374/EEC of 25 July 1985 on the approximation of the laws, regulations and administrative provisions of the Member State concerning liability for defective products.

(2) Limitation of liability

Article 1 of the 1976 convention on limitation of liability of owner of ships provides that ship-owner may limit their liability to all claims arising from any incident. The size of limitation is based upon the tonnage of the ship. Within the convention, the term ship-owner is held to include the ship's owner, charterer, manager or operator.

International conventions dealing with limitation of liability are phrased in neutral terms with regard to the presence of a master or crew; therefore, circumstances in which a ship has no person on board do not appear to undermine the operation of those conventions.

(3) Bill of lading

Bill of lading is a written document signed on behalf of the owner of ship in which goods are embarked, and the ship-owner acknowledges the receipt of the goods, and undertakes to deliver them at the end of voyage. Typically, the shipper will sign the bill of lading along with the owner of the cargo at the point that shipper takes carriage of the cargo in question. The bill of the lading will then be signed by the cargo's recipient once it has reached its destination. In other words, the document accompanies the cargo all the time, and is signed by the owner, shipper and recipient. It will generally describe the nature and quantity of goods being shipped.

A question arises as in the absence of a master or any crew on board the ship, how will the bill of lading be signed by ship's master?

III. Conclusion

The shipping industry is a rich, highly complex and diverse industry, which has a history of both triumph and tragedy in its adoption of technology. In light of the potential for the remote and autonomous ship, and for the sake of contributing to the assurance of safe and efficient operation, it is better to understand the impact on the industry. The taxonomy of automation between human and machine is vast and complex, especially in the sector of law.

Therefore, before the system can reach fully autonomy and undertake independent, our law should be ready.

IV. Reference

[1] Comité Maritime International, Maritime Law for Umanned Ships, 2017, available at https://comitemaritime.org/work/unmanned-ships/ (last visited Dec. 25, 2018)

[2] MUNIN, D9.3: Quantitative Assessment, Oct. 10, 2015, available at http://www.unmanned-ship.org/munin/news-information/downloads-information-material/munin-papers/ (last visited Dec. 25, 2018)

[3] Martime Digitalisation & Communication, MSC 100 set to review MASS regulations, Oct. 23, 2018, available at https://www.marinemec.com/news/view,msc-100-set-to-review-mass-regulations_55609.htm (last visited Dec. 25, 2018)

[4] IMAREST, Autonomous Shipping-Putting the human back in the headline, April. 2018, available at https://www.imarest.org/policy-news/institute-news/item/4446-imarest-releases-report-on-the-human-impact-of-autonomous-ships (last visited Dec. 25, 2018)

[5] Danish Martime Authority, Analysis of regulatory barriers to the use of autonomous ships(Final Report), Dec. 2017, available at https://www.dma.dk/Documents/Publikationer/Analysis%20of%20Regulatory%20Barriers%20to%20the%20Use%20of%20Autonomous%20Ship
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