

The Legal Disruption of the MASS Code and The Shift in Maritime Inspection Standards

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ABSTRACT

The global shipping industry is undergoing a structural transition toward automation following the adoption of the international Code of Safety for Maritime Autonomous Surface Ships (MASS Code) by the International Maritime Organization. However, Indonesia's maritime casualty investigation system, governed by Undang-Undang Nomor 17 Tahun 2008 tentang Pelayaran, remains heavily bound to a conventional, human centric paradigm based on the physical presence of a master onboard. This study analyzed the compatibility of the Indonesian Maritime Court's current jurisdictional framework with the operational shifts brought by the MASS Code. This research employed a normative legal method, utilizing both statute and conceptual approaches. The findings revealed that the implementation of autonomous ships shifts the locus of investigation from sea to shore based Remoted Operation Centers and alters the nature of evidence from physical observations to digital forensics. Consequently, the Maritime Court faces a significant regulatory gap concerning its enforcement targets and expert technical competencies. To address this disruption, this study recommended expanding the legal definition of masters and seafarers under national law to encompass remote operators and integrating a Cyber and Maritime Automation Expert Panel into the Maritime Court's institutional framework.



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INTRODUCTION

The global shipping industry is entering a structural transition phase toward full autonomy. The International Maritime Organization (IMO), through its 111th session of the Maritime Safety Committee (MSC 111) held from May 13-22, 2026, in London, adopted the International Code of Safety for Maritime Autonomous Surface Ships (MASS Code) as the first global regulatory framework to comprehensively regulate autonomous ships. This code is non-mandatory and will come into effect on July 1, 2026. The enactment of this code marks the beginning of the Experience Building Phase (EBP), a period of operational data collection that will form the basis for the development of a mandatory code targeted for adoption no later than July 1, 2030, and entry into force on January 1, 2032.

Since the regulatory scoping exercise framework was established by the IMO MSC in December 2018, Maritime Autonomous Surface Ships (MASS) have been classified into four degrees of autonomy, ranging from ships with decision-making aid systems to ships that are fully controlled by autonomous systems without any human presence on board at all (MASS). This shift is not just a futuristic technological discourse, but several countries such as Norway and Japan have carried out operational trials of MASS on a commercial scale and in limited waters, while the IMO itself admits that existing shipping safety conventions such as Safety of Life at Sea (SOLAS), Marine Pollution (MARPOL), Standards of Training, Certification, and Watchkeeping 1978 (STCW 1978), and the

Convention on the International Regulations for Preventing Collisions at Sea 1972 (COLREG 1972) are prepared with the assumption that ships are directly controlled by humans.

In this global landscape, Indonesia occupies a crucial geographical and economic position. As the largest archipelagic nation with the Indonesian Archipelagic Sea Lanes (ALKI) traversed by some of the busiest international shipping routes, Indonesia's interest in the MASS legal regime is an unavoidable urgency. However, the national shipping safety legal system still relies entirely on a conventional paradigm rooted in Undang-Undang Nomor 17 Tahun 2008 tentang Pelayaran (UU No.17 Tahun 2008) and its derivative regulations. Furthermore, the national shipping safety legal system genealogically traces its roots to the colonial commercial law concept through the *Wetboek van koophandel* (WvK), which places the captain as the sole authority and responsibility holder on board. To date, there have been no MASS trials for civilian commercial shipping in Indonesian waters under the Shipping Law regime. Instead, ongoing ship autonomy initiatives, such as the development of unmanned autonomous submarines by the Ministry of Defense, fall within the scope of the military's primary weapons systems (*alutsista*). This means that ship autonomy in Indonesia is still outside the jurisdiction of the Maritime Court and the merchant ship accident investigation regime.

Essentially, MASS remains subject to the general provisions of UU No. 17 Tahun 2008 regarding seaworthiness, registration, and ownership. The real problem lies in the fact that the articles governing the Maritime Court's investigative powers lack legal object. As an institution under the Ministry of Transportation, not a full-fledged judicial body, the Maritime Court's authority is constitutionally limited to imposing administrative sanctions on seafarers' certificates of proficiency. Consequently, the absence of certified seafarers aboard MASS undermines the Maritime Court's inspection objective of enforcing maritime law. This vulnerability risks becoming apparent if an accident occurs involving a MASS sailing and/or operating in Indonesian waters during the 2026-2030 EBP period, a crucial time for Indonesia to adjust its regulations before the MASS Code becomes mandatory on January, 1 2032.

So far, studies on MASS in Indonesian legal literature have mostly touched on the issue of flag state responsibility within the general framework of international maritime law, one of which is a journal article entitled "MARITIME AUTONOMOUS SURFACE VESSELS (MASS) AND NORMATIVE STUDY ON FLAG STATE RESPONSIBILITY IN INTERNATIONAL SEA LAW" by Moli Aya (2025). In the article, the author explains the legal status of MASS and the concept of flag state responsibility within the framework of international maritime law, such as UNCLOS 1982. There is also a paper entitled "Legal Challenges in the Utilization of Maritime Autonomous Surface Vessels (MASS)" by A. Indah (2022) which examines MASS from the perspective of the concept of the relationship between vessels and flag states. The article focuses on how flag states control the seaworthiness of unmanned vessels under international law. Although previous studies have provided a foundation for the analysis of MASS, the perspective used has not been directed at the authority of the Shipping Court. Therefore, through this article, the author wants to fill the analytical gap that exists in the investigative and administrative competence of the Maritime Court as an institution that will be the first authority to conduct an investigation when a MASS accident occurs in Indonesian waters.

Based on this description, this study focuses on three main topics. First, the competence of the Maritime Court in examining ship accidents according to UU No. 17 Tahun 2008, PP No. 9 Tahun 2019, dan Permenhub No.6 Tahun 2020, and the extent to which this legal framework can be applied to accidents involving MASS. Second, the projected disruption of the jurisdiction and administrative authority of the Maritime Court after the implementation of the MASS Code on July 1, 2026, and ahead of the mandatory implementation regime in 2032, particularly regarding legal subjects who can be held accountable. Third, the direction of national legal reforms relevant to the Maritime Court, taking into account a functional comparative study of the approaches of countries that have implemented MASS trials, such as Norway. This comparison focuses on the functions and allocation of responsibilities of institutions that have similarities with the Maritime Court in terms of ship accident investigations.

RESEARCH METHODS

This research employs a normative research method, which utilizes two primary approaches simultaneously. The first is the statute approach, which examines laws and regulations related to the issue under study. The second is the conceptual approach, which builds on the views and doctrines developed in legal science to construct a logical legal argument. This combination of two approaches is necessary because the study of synchronizing the Maritime Autonomous Surface Ships (MASS) Code into national law requires not only a textual analysis of existing positive legal norms but also a conceptual understanding of the concept of a legal framework for autonomous ships, which is historically unprecedented in international maritime regulation. Primary legal materials include laws and binding international treaties. The MASS Code recently adopted by the IMO serves as the primary legal basis for the analysis, the Norwegian Maritime Authority (NMA) serves as comparative legal basis, and national laws and regulations, such as Undang-Undang Nomor 17 Tahun 2008 tentang Pelayaran (UU No. 17 Tahun 2008), Peraturan Pemerintah Nomor 9 Tahun 2019 tentang Pemeriksaan Kecelakaan Kapal (PP No. 9 Tahun 2019), Peraturan Menteri Perhubungan Nomor 6 Tahun 2020 (Permenhub No. 6 Tahun 2020), and other relevant laws and regulations, serve as primary domestic legal sources. Secondary legal sources include scientific literature, journals, legal expert opinions, and draft laws.

RESULTS AND DISCUSSION

Maritime Court Competency and Evaluation Standards in Law Enforcement in Indonesian Waters

The Maritime Court is not a new legal institution in Indonesia; rather, its existence is a legacy of the Dutch East Indies colonial era. This institution was established based on the *Ordonnantie op den Raad voor de Scheepvaart* in *Staatsblad* Number 215 of 1934, under the Ministry of Maritime Affairs. This institutional structure was then adopted into the national legal system after independence without fundamental changes. Through Article 1, Number 58 UU No.17 Tahun 2008, the Maritime Court is explicitly defined as a council of experts under and responsible to the Minister of Transportation to conduct further investigations into ship accidents. This definition confirms that the Maritime Court is not a judicial body as referred to in Article 24 Undang-Undang Dasar Negara Republik Indonesia 1945 (UUD NRI 1945), but rather a quasi-judicial body (a pseudo-court) under the executive branch or government.

Currently, the operational basis of the Maritime Court is regulated in Articles 251-253 UU No.17 Tahun 2008, as last amended by UU No. 66 Tahun 2024 concerning the Third Amendment to UU No.17 Tahun 2008 tentang Pelayaran (UU No. 66 Tahun 2024). Article 251 UU No. 66 Tahun 2024 regulates the function of the Maritime Court in carrying out further examinations while enforcing the code of ethics of the seafaring profession. Furthermore, Article 252 regulates the authority of the Maritime Court to examine accidents involving merchant ships with merchant ships, merchant ships with state ships, or merchant ships with warships. Meanwhile, accidents that purely occur between warships are outside the jurisdiction of the Maritime Court and are examined by the Indonesian Navy (TNI AL) as stipulated in Article 4 paragraph (3) of PP No. 9 Tahun 2019. Then, Article 253 formulates the main duties of the Maritime Court, which consist of investigating the causes of accidents, examining procedural negligence by the Captain and/or Ship's Officers, examining the contribution of negligence by the operator and/or ship owner, and making decisions on administrative sanctions to the Minister of Transportation.

This quasi judicial status limits the Maritime Court's competence. The Maritime Court's investigation follows a preliminary examination conducted by the Port Manager. The final outcome of the inventory is an administrative decision submitted to the Minister of Transportation, not a judicial decision enforceable as a general court ruling. The authority to impose sanctions is also administrative, ranging from warnings to the temporary revocation of a seafarer's certificate of expertise for a maximum period of two years, as stipulated in Article 373a WvK.

Based on Peraturan Menteri Perhubungan Nomor 30 Tahun 2022 tentang Perubahan atas Peraturan Menteri Perhubungan Nomor 6 Tahun 2020 (Permenhub No. 30 Tahun 2022), the Maritime Court's administrative decisions fall within the scope of state administrative law. This has implications

for the Maritime Court's structural authority: the court does not have the authority to adjudicate criminal aspects of maritime affairs or civil matters, such as compensation claims and insurance claims. Both criminal and civil aspects of maritime affairs remain under the absolute jurisdiction of general courts. This limited competence directly impacts the examination parameters used by the Maritime Court. The primary instruments used to determine the parameters of a Maritime Court's examination are the STCW 1978, ratified by Keputusan Presiden Nomor 60 Tahun 1986, and the COLREG 1972, ratified by Keputusan Presiden Nomor 50 Tahun 1979.

In both the STCW 1978 and COLREG 1972, the maritime professions referred to as the objects of a Maritime Court's examination rely on physical and sensory measures, including visual and auditory observations by humans, as well as mechanical maneuvers such as course and speed changes performed manually at the command of the officer of the watch or captain on the bridge. Furthermore, the principle of Good Seamanship demands professional judgment based on human reasoning and experience. The maritime profession, based on physical presence on the bridge and human professional judgment, makes the parameters of a Maritime Court's examination of seafarer negligence entirely human centered.

Projections of Legal Disturbances Post Ratification of the MASS Code in Indonesia

The Indonesian ship accident investigation system, as stipulated in Article 251 UU No.17 Tahun 2008 in conjunction with UU No. 66 Tahun 2024 and Permenhub No. 6 Tahun 2020, is built on the physical locus delicti paradigm. For example, the Harbor Master compiles a Preliminary Examination Report based on the testimony of witnesses on board the ship, the physical condition of the hull and machinery, and a manual logbook. The Maritime Court then assesses professional error or negligence based on the reconstruction of events on the deck and bridge. In MASS, particularly for ships with a degree of autonomy 3 (remotely controlled ships), which are the primary focus of the MASS Code for merchant vessels, the object of the investigation shifts to a realm no longer physically at sea.

The MASS Code has two concrete shifts in the operational aspects of ship accident investigations. First, the inspection location has shifted from the ship to shore facilities. The implementation of the MASS Code shifts the ship's control center to a remote operation center (ROC). This allows material evidence, control command logs, data transmission records, communication latency parameters, and manual intervention records when automated systems fail to be stored on the ROC server, rather than on the ship. This shift in control center creates problems not only concerning technical procedures but also the authority of the Maritime Court in examining ship accidents. Currently UU No. 17 Tahun 2008 jo. UU No. 66 Tahun 2024 still frames the Maritime Court's authority within the context of examining ship accidents occurring in waters, thus not addressing the possibility of seizing data from land-based facilities. This shift in location has given rise to new competency standards in the form of cyber risk management as part of the operational prudential obligation.

Second, the nature of evidence shifts from physical observation to digital forensics, which requires substantively different examiner competencies. The current composition of the Maritime Court's Expert Panel consists of senior seafaring officers, such as captains and marine engineers, as well as legal scholars, as stipulated in Articles 19 and 20 PP No. 9 Tahun 2019. Although the composition of the Maritime Court's Panel of Experts is competent in assessing conventional good seamanship principles, this competence does not guarantee sufficient capability to audit the integrity of cyber logs, detect timestamp manipulation, and assess the validity of digital data chains of evidence. This shift in the nature of evidence has given rise to updated competency standards, specifically the speed and accuracy of manual intervention when automation fails or alerts to anomalies. In conventional accident investigations, the captain is assessed through direct observation of weather and traffic conditions, while the Remote Master, as the onshore captain, is assessed based on the time lag between system alerts and corrective action. Without the addition of digital or cyber forensics experts to the Maritime Court's Panel of Experts, there is concern that the panel will lack the capacity to examine the updated examination subjects. In other words, changes in the membership composition are needed to ensure the Maritime Court's Panel of Experts can address the substance of issues that may arise during the examination if MASS is actually implemented in Indonesia.

In addition to updates regarding the location and object of the examination, there is also the possibility of expanding the legal subject matter or the possibility of summoning third parties. Regarding the expansion of the legal subject matter of examination, it does not essentially arise from a normative vacuum. Instead, UU No. 66 Tahun 2024 has expanded the jurisdiction of the Maritime Court's examinations beyond individual shipmasters and officers. In essence, UU No. 66 Tahun 2024 expands the authority of the Maritime Court to encompass examinations of operator and port official negligence in the event of a ship accident. This demonstrates that the Indonesian legislature's paradigm is open to expanding examinations beyond individual seafarers. The proposal to expand the legal subject matter related to accidents involving MASS is not a new concept, but rather an ongoing regulatory adjustment. However, although the expansion of the subject matter of examination has been accommodated through UU No. 66 Tahun 2024, the regulations have not addressed the possibility of involving ROCs, autonomous navigation software vendors, or maritime cyber network providers in the ship accident investigation process conducted by the Maritime Court. This is a regulatory gap that could create vulnerability to disruption of the MASS Code. The expansion of the legal subject matter can be achieved by considering that if the accident is triggered by software failure or satellite interference, then the inspection authority can be extended to ROC managers, software technicians, and network providers. This means that legal instruments can be issued which are derivatives of the law.

Reflecting on Norway's Unmanned Vessel Accident Inspection System

The digital seaworthiness assessment of autonomous vessels in Norway is conducted by the Norwegian Maritime Authority (NMA) under Norway's maritime safety regulatory framework, which has been supplemented by specific guidelines for autonomous and remotely operated vessels. The most significant instrument in this context is the *Guidance in Connection with the Construction or Installation of Automated Functionality Aimed at Performing Unmanned or Partially Unmanned Operations (RSV 12-2020)* issued by the NMA as a guideline for the testing and certification of autonomous vessels. The guidance emphasizes that autonomous vessels must achieve an equivalent level of safety to conventional ships. Consequently, the assessment process extends beyond the examination of design specifications and technical documentation, encompassing risk assessments, operational simulations, automated system testing, and continuous evaluation of operational data before a vessel is permitted to progress to higher levels of autonomy.¹ This approach can be observed in the development of the Yara Birkeland project, which underwent phased testing while retaining crew members on board during the initial operational stages before receiving approval for higher levels of autonomous operation.

The authority responsible for investigating maritime accidents in Norway is the Norwegian Safety Investigation Authority (NSIA), which is designated as the maritime accident investigation body under Chapter 18 of the Norwegian Maritime Code. The relevant provisions do not distinguish between conventional vessels and autonomous vessels in determining investigative jurisdiction. Accordingly, accidents involving uncrewed vessels or remotely operated vessels remain subject to the same investigative framework applicable to traditionally crewed ships. The jurisdiction of the NSIA is determined by factors such as the vessel's status, the location of the incident, and the severity of the accident, rather than by the physical presence of crew members on board. Therefore, in the event of an accident involving the Yara Birkeland or any other Norwegian-flagged autonomous vessel, the NSIA retains full authority to conduct an investigation and examine the causes of the occurrence.

In conducting investigations of accidents involving autonomous vessels, the NSIA is authorized to examine all factors that may have contributed to the occurrence, including failures in navigation software, sensor malfunctions, errors in decision-making algorithms, and delays or mistakes by operators working within a shore control centre. However, this authority is limited to the performance of a safety investigation, the primary purpose of which is to identify the causes of accidents and prevent similar incidents from recurring in the future. The NSIA does not possess the authority to determine fault or assign civil and criminal liability between shore-based operators and technology providers responsible for autonomous systems. The determination of legal liability remains within the jurisdiction of courts or other dispute resolution mechanisms, which may rely upon NSIA investigation reports as

factual evidence. Accordingly, the Norwegian system maintains a clear separation between the functions of safety investigation and legal adjudication, whereby the NSIA operates as a fact-finding body rather than an adjudicative authority.

Formulation of the Future Legal Construction of the Indonesian Maritime Court

Formulating recommendations for the future legal architecture of the Indonesian Maritime Court demands a radical yet measured reconstruction, particularly in anticipation of the MASS Code taking effect on July 1, 2026, which marks the commencement of the EBP. Indonesia is bound by a crucial deadline leading up to the adoption of the mandatory code in 2030 and its full implementation on January 1, 2032. Consequently, maintaining a conventional human centric paradigm within the national marine casualty investigation system is a legal anachronism that risks triggering a jurisdictional void. The first strategic step Indonesia must take is to adopt the positive aspects of the Norwegian legal system through a functional equivalence approach. Norway, through the NMA, has successfully operated commercial autonomous vessels in their domestic waters not by dismantling traditional maritime safety institutions, but by legally reconceptualizing the roles of masters and seafarers.

Within the context of Indonesian positive law, this reconstruction must be realized through a comprehensive adjustments to UU No. 17 Tahun 2008. The primary hurdle currently lies in Article 1 number 41 UU No. 17 Tahun 2008, which restrictively defines a master as a crew member who must be physically present onboard a commercial vessel a notion reinforced by the spirit of Article 341 *WvK*. To prevent the Maritime Court from losing its subject matter jurisdiction when adjudicating autonomous vessel accidents, the draft amendment to UU No.17 Tahun 2008 must extend the legal definition of a master to accommodate the existence of a Remote Master. This reconceptualization must assert that a master is personnel holding absolute qualifications and competency certifications to command, control, and bear full responsibility for the vessel's navigational safety, whether stationed onboard or executing command functions from a Remote Control Centre (RCC). Concurrently, a similar expansion must be applied to the terminology of seafarers or crew members to encompass shore based operators (Remote Operators). By broadening the scope of these legal subjects, the competency certifications held by such shore-based personnel will automatically fall under the administrative jurisdiction of the Maritime Court, as mandated by Article 251 of UU No. 17 Tahun 2008. Consequently, in the event of a marine casualty caused by operational negligence at a control centre, the Maritime Court retains absolute competence to examine, adjudicate, and impose administrative sanctions in the form of suspending or revoking their professional competency certificates.

Although Norway's functional approach offers a progressive solution, Indonesia cannot simply replicate the system verbatim; rather, it must modify it to mitigate domestic institutional weaknesses. In Norway, investigations are conducted by the Accident Investigation Board Norway (AIBN), which is multisectoral and independent. In contrast, Indonesia splits post-accident roles between the National Transportation Safety Committee (KNKT) for technical-safety aspects, and the Maritime Court for ethical-professional and administrative aspects. A fundamental weakness overshadowing the Maritime Court as it faces the era of automation is the limited capacity of conventional maritime judges to interpret digital data transmissions, artificial intelligence technology, cyber sensors, and navigational algorithms. Should an autonomous vessel accident occur in ALKI due to software failure or a cyberattack, there is a high risk of confirmation bias, where maritime judges might erroneously indict the Remote Master for an error that actually stems purely from systemic manufacturing failures or third-party interventions.

As a concrete mitigation measure, this legal formulation recommends the establishment of a Cyber and Maritime Automation Expert Panel structurally integrated into the examination process of the Maritime Court of the Republic of Indonesia. This specialized panel will perform the crucial function of conducting digital forensic analysis on Voyage Data Recorder data and reviewing pre-accident telemetry to rigorously distinguish between human error and system failure. Through its binding analysis reports, this expert panel will act as an *Amicus Curiae* to guide the judicial panel, thereby preventing technological misinterpretations.

CONCLUSION

The Maritime Court has been raified before; rather, its existence is cause in legacy of the Dutch East of the Dutch East Indies colonial era. In other hand its been placed in Indonesia constitution of 1945, confirms that the Maritime Court is not a judicial body. The Maritime Court is explicitly defined as a council of experts under and responsible to the Minister of Transportation to conduct further investigations into ship accidents. The Indonesian ship accident investigation system, as stipulated in Article 251 UU No.17 Tahun 2008 in conjunction with UU No. 66 Tahun 2024 and Permenhub No. 6 Tahun 2020, is built on the physical locus delicti paradigm, therefore The MASS Code has two concrete shifts in the operational aspects of ship accident investigations. As a concrete mitigation measure, we has to formulate legal formulation recommends the establishment of a Cyber and Maritime Automation Expert Panel structurally integrated into the examination process of the Maritime Court of the Republic of Indonesia.

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