ABSTRACT

The maritime industry has much to gain from adopting autonomous vessels (AVs) due to potential for reduction of operational costs, safety risks for humans onboard, reduced fuel consumption and streamlined supply chains that increase economic efficiency. As with other emerging technologies, these benefits are accompanied by new regulatory uncertainties and societal risks. As international maritime legislation has traditionally been designed for manned vessels, new challenges arise from the safety and liability risks stemming from the legal treatment of AVs, the roles of humans designing, operating and maintaining them, apportionment of legal liability for harms incurred, software and hardware issues, and cybersecurity risks. There are concerns over their economic feasibility, displacement of seafarers, and the impact on international trade. Existing maritime regulations have yet to account for the full scope of these risks. This review fills existing research gaps by examining the risks introduced by AVs and the policy responses to address them. We review legal uncertainties, software and hardware issues, human factors, cybersecurity risks, and socio-economic implications. We find that safety and liability risks arise primarily from the limited scope of existing definitions pertaining to vessels, human responsibilities, collision avoidance protocols and classification of vessels for military uses. Cybersecurity requires more in-depth examination specific to AVs, new standards, and coordination across the maritime network and new strategies are required for retraining and education of the workforce.