REGULATING MARITIME OCCUPATIONAL HEALTH AND SAFETY IN CANADIAN ARCTIC WATERS[1]

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Introduction

The increasing loss of sea ice in the Arctic is expected to result in significant growth ofand change in the various forms of maritime activitytaking place in the region. These changes will affect the types and scale of occupational health and safety hazards for seafaring and fishing communities. Although recently a moratorium on fishing in the Central Arctic Ocean was adopted by a group of Arctic and non-Arctic states, there is the prospect of increased fishing in other arctic waters, including in northern Canada. Ice and low temperatures in Arctic waters are threats to navigation safety and the health and safety of maritime workers. Extended hours of darkness and daylight disturb human biological rhythms and affect crew's health and performance. The lack of search and rescue and medical evacuation infrastructure in the region has the potential to affect safety communication and emergency response, making both navigational safety and crew members' lives more vulnerable.

This presentation explores occupational health and safety challenges involved in Arctic shipping and fishing activities. Findings from an analysis of occupational health and safety standards applicable to Canadian Arctic shipping and fishing activities leads us to enquire whether functional equivalence of health and safety protection for seafarers and fishers is a desirable and a feasible option, taking into account the next stage of development of international maritime safety standards, including a Polar Code phase 2 and related amendments to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW).

Maritime Activities in the Arctic

Maritime activitiescontinue to increasein Canadian Arctic waters. Significant growth in fishing, cargo and cruise shippinghad been reported (see Table 1).Lasserre (2018) observes the expansion of Arctic voyages between 2005 and 2016. According to this research, fishing voyages north of 60° N increased more than six times between 2005 and 2016 (Lasserre 2018). Hollowed el al (2013) suggest that due to climate change, certain fish and shellfish stocks, such as snow crab, polar cod, Arctic Skate Greenland Shark and Beaked redfish have high potentials to move from the sub-Arctic to the Arctic Ocean, which may also affect fishing activities in this area.

Table 1. Number of voyages in the Canadian Arctic.

	2005	2007	2009	2010	2012	2014	2015	2016
Number of ship voyages	123	201	210	309	322	301	315	346
Fishing vessels	22	51	65	123	114	119	129	131
Cruise Ships	12	17	18	18	23	11	18	20
Cargo Ships	65	101	100	124	122	108	120	147

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In 2014, Arctic shipping comprised 9.3% of the world's shipping traffic. A 12.4% share is fishing vessels, and a 10.1% share of cargo vessels and tankers (Eguíluzet al 2016). Although the concentration of shipping activity is in the Norwegian Sea and Barents Sea, cargo shipping voyages in the Canadian Arctic doubled between 2005 to 2016 (Eguíluzet al 2016).

The shorter distance and the threat of pirates and armed robbery against ships in Southeast Asia and Indian Ocean have stimulated interest in using Arctic shipping routes (Bai 2015). The Northwest Passage, mostly through Canadian Arctic waters, is mainly used for shipping to the Arctic. The commercial shipping is mainly used for the Northern community re-supply (Arctic Council 2009). Compared to the Northeast Passage, the marine transit use level of the Northwest Passage is much lower (Lawson 2017).

The increase of tourism in the Arctic has also led to the growth of cruise and venture voyages in the Canadian Arctic waters from 12 in 2005 to 20 in 2016. The increase of cruise vessels has entailed not only licensed seafarers, but also non-seafarer crews, such as hotel staff, thus diversifying the work force in Arctic maritime communities become diversified with consequences for occupational health and safety standards.

Occupational hazards in the Arctic

Although Arctic shipping constitute a small proportion of the world's shipping traffic, and the international marine transit use level of the Canadian Arctic water is much lower compared to the Northeast Passage, the safety risks related to Arctic shipping has attracted attention from many stakeholders and actors in the global maritime industry.

Adopted by the International Maritime Organization (IMO) in 2014, the International Code for Ships operating in Polar Waters (Polar Code) identifies ten sources of hazards for polar maritime activities, which may lead to high levels of risk:

(1) Ice, which may affect hull structure, stability, machinery systems, navigation, the outdoor working environment, maintenance and emergency preparedness tasks and malfunction of safety equipment and systems;
(2) Topside icing, with potential reduction of stability and equipment functionality;
(3) Low temperature, as it affects the working environment and human performance, maintenance and emergency preparedness tasks, material properties and equipment efficiency, survival time and performance of safety equipment and systems;
(4) Extended periods of darkness or daylight as it may affect navigation and human performances;
(5) High latitude, which affects navigation systems, communication systems and the quality of ice imagery information;
(6) Remoteness and possible lack of accurate and complete hydrographic data and information, reduced availability of navigational aids and seamarks with increased potential or groundings compounded by remoteness, limited Search and Rescue facilities, communication capability, and delays in emergency in emergency response;
(7) Potential lack of ship crew experience in polar operations, with potential for human error;
(8) Potential lack of suitable emergency response equipment;
(9) Rapidly changing and severe weather conditions, with the potential for escalation of incidents;
(10) The environment with respect to sensitivity to harmful substances and other environmental impacts and its need for longer restoration (International Maritime Organisation 2010).

In addition, ice breaking noise is also reported toaffect quality of sleep, which may increase the fatigue level of seafarers on board (Sillitoe et al 2010). The lack of port infrastructure in the Arctic region, increase the difficulty of discharging operation. The lack of maritime chart also increases the unpredictability of the Arctic navigation, and increase the risk of grounding. The remoteness of search and rescue services also leaves seafarers working in the arctic at risk. How to ensure safety of life at sea is a crucial issue for the future development of maritime industries in the Arctic. Working in the Arctic in low-temperature environment may also create risks for individual seafarers, including numbness, frostbite, and hypothermia (Mäkinen and Hassi 2009). Long-term working in the cold may also cause musculoskeletal

disorders (Pienimäki 2002). Cooling also worsens the symptoms of many diseases, including respiratorydisease and heart diseases (Pienimäki 2002).

Arctic Maritime Occupational Health and Safety Regulatory Frameworks

International Level

The maritime health and safety issues are touched by three levels of governance. Both of the fishing and shipping activities are increasing in the Canadian Arctic, but these two types of maritime activities are subject to different international legal instruments.

In terms of Arctic shipping, the International Code for Ships operating in Polar Waters has been developed to supplement existing IMO instruments in order to increase the safety of ships' operation and mitigate the impact on the people and environment in the remote, vulnerable and potentially harsh polar waters. In addition, the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW) also provides special training requirements for seafarers involved in polar water navigation. Another relevant legal instrument, Maritime Labour Convention, 2006, although has not specific regulations on polar shipping, provides labour regulations on maritime occupational health and safety.

The Polar Code covers maritime safety issues in the Part I-A from the following aspects: (1) a mandatory polar water operational manual on board, (2) ship structural requirements to adapt polar temperature and ice conditions, (3) strengthened stability requirements to sustain ice-related damages and ice accretion, (4) watertight integrity, (5) special machinery requirements to adapt ice accretion, ice and snow ingestion, (6) fire safety and protection, (7) life-saving appliances and arrangements, (8) navigational safety requirement, including equipment and information, (9) effective maritime safety communication, (10) voyage planning requirements, (11) safety manning and training requirements.

The STCW convention adopted special requirements for seafarers' training and competency in the 2010 amendment. Noting several accidents have occurred in the polar waters as a result of the increase in maritime traffic, and recognising the remoteness and the singular hydrographic, oceanographic, and glaciological characteristics of polar waters, to the extent that search and rescue, care and evacuation of persons entail considerable difficulties, measures to improve the competency of seafarers were adopted in the STCW convention(International Maritime Organisation 2010). On July 1st, 2010, the Resolution 11 of Conference of Parties to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 was adopted. The Resolution 11 recommends governments to adopt measures conducive to ensuring masters and officers have appropriate training and experience so that they are competent to plan voyages to polar waters, navigate safely in polar waters within ice-covered areas and supervise and ensure compliance with the requirements relating to safety of life at sea. On November 25th, 2016, the Maritime Safety Committee adopted the Resolution MSC.416 (97) Amendments to the STCW convention, 1978. In this Resolution, seafarers in charge of a navigational watch on ships operating in polar waters shall hold a certificate in basic training for ships operating in polar waters, as required by the Polar Code. In addition, masters and chief mates shall hold advanced training certificates as required by the Polar Code.

The Maritime Labour Convention, 2006 establishes a general health and safety protection and accident prevention regime in Regulation 4.3. Although the Regulation 4.3 does not spell special requirements for the polar water navigation, the regulation set up goal-based rules for seafarers' health and safety protection, including seafarers navigating to the Arctic. The Maritime Labour Convention, 2006 requires flag states to provide seafarers occupational health protection and live, work and train on board in a safe and hygienic environment, requests states to develop and promulgate national guidelines for the management of occupational health and safety on board after consultation with representatives of shipowners and seafarers.

The maritime occupational health and safety standards set up by the Maritime Labour Convention, 2006 requires that (1) occupational safety and health policies and programmes on ships developed by the member states, including risk evaluation, training and instruction of seafarers; (2) reasonable precautions

to prevent occupational risks on board ship, including measures to reduce and prevent the risk of exposure to hazard substances, and injury or disease that may arise from the use of equipment and machinery on board ships; (3) on-board programmes for the prevention of occupational accidents, injuries and diseases and for continuous improvement in occupational safety and health protection, involving seafarers' representatives and all other persons concerned in their implementation, taking account of preventive measures, including engineering and design control, substitution of processes and procedures for collective and individual tasks, and the use of personal protective equipment; and (4) requirements for inspecting, reporting and correcting unsafe conditions and for investigating and reporting on-board occupational accidents.

The Regulation 4.3 also requires the competent authority shall ensure that: (1) occupational accidents, injuries and diseases are adequately reported, taking into account the guidance provided by the International Labour Organization with respect to the reporting and recording of occupational accidents and diseases; (2) comprehensive statistics of such accidents and diseases are kept, analysed and published and, where appropriate, followed up by research into general trends and into the hazards identified; and (3) occupational accidents are investigated. And The competent authority shall require that shipowners conducting risk evaluation in relation to management of occupational safety and health refer to appropriate statistical information from their ships and from general statistics provided by the competent authority.

Canada ratified the Polar Code and implemented it through the Arctic Shipping Safety and Pollution Prevention Regulations (SOR/2017-286), which are applicable to cargo vessels of 500 gross tonnages or more, passenger vessels, and other vessels of 500 gross tonnages or more. Canada is also a member state of the STCW convention and the Maritime Labour Convention, 2006.

In terms of the health and safety of fishing workers in the Arctic Region, it is not specially addressed in the Polar Code and International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel (STCW-F), 1995.

At the 55th session of the Sub-Committee on Ship Design and Equipment in March 2011, the Sub-Committee agreed that Polar Code should take a two-step approach. At the first step, relevant mandatory requirements should apply to SOLAS passenger and cargo ships. At the second step of the Polar Code, non-SOLAS ships, such as fishing vessels may be covered by enhanced safety measures in polar waters(International Maritime Organisation (2011). If the second phase of the Polar Code will be adopted after the consideration of the IMO, STCW-F convention will need to be revised to incorporate relevant training requirements for fishing crew conducting watches on ships in polar waters.

In terms of health and safety standards on commercial fishing vessels, the Work in Fishing Convention, 2007, Article 31 provides general standards for health and safety regulations on board fishing vessels. Member states are required to adopt laws and regulations concerning (1) the prevention of occupational accidents, diseases and work-related risks on board fishing vessels, including risk evaluation and management, training and on-board instruction of fishers; (2) training for fishers in the gear handling and the knowledge of the fishing operations; (3) the health and safety obligations of fishing vessel owners, fishers and others concerned; (4) the reporting and investigation of accidents on board fishing vessels flying its flags and (5) the setting up of joint committees on occupational health and safety. The Article 32 further requires, for fishing vessels of 24 meters in length and over normally remaining at sea for more than three days, that (1) fishing vessel owners should establish on-board procedures for the prevention of occupational accidents, injuries and diseases; and (2) require that fishing vessel owners, skippers, fishers and other relevant persons be provided with sufficient and suitable guidance, training material on how to evaluate and manage risks to safety and health on board fishing vessels.

The Work in Fishing Convention, 2007 came into force on 16th, November 2017, but Canada has not ratified this convention.

Regional Level: Arctic Council

At the regional level, Arctic council is the major institution develop regional arctic governance instruments. The Arctic Council, a "high level forum" established in 1996 by the eight Arctic states,Canada, Denmark (Greenland), Finland, Iceland, Norway, Russia, Sweden, and the United States. According to the founding Ottawa Declaration of 19 September 1996, the Council was designed to promote:

"Cooperation, coordination and interaction among the Arctic States with the involvement of the Arctic indigenous communities and other Arctic inhabitants on common Arctic issues, in particular issues of sustainable development and environmental protection in the Arctic."

In addition, the Arctic Council oversees and coordinates various programs established under the Arctic Environmental Protection Strategy, including Arctic Monitoring and Assessment Program (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Protection of the Arctic Marine Environment (PAME); and Emergency Prevention, Preparedness and Response (EPPR). Furthermore, the Arctic Council commits to oversee and coordinate a sustainable development program, to disseminate information, encourage and promote interest in Arctic-related issues (Arctic Council 1996).

As per the 2030 Agenda for Sustainable Development, promoting occupational health and safety is confirmed by the Goal Eight Decent Work and Economic Growth. The realization of the right to decent work requires the application of safe and healthy working conditions; the prevention and control of occupational diseases; and the provision of adequate benefits (International Labour Organisation 2017).

The Arctic Council, as a body to oversee and coordinate sustainable development programs, make efforts to promote occupational health and safety in the Arctic. Finland, as the current chair of the Arctic Council, has proposed to establish a practice-based network of OHS institutes from the Arctic states to find solutions to the challenges of working life in the Arctic (Arctic Council 2017-2019).

In 2013, the Arctic Council working group Protection of the Arctic Marine Environment (PAME) initiated a workshop on Health Safety and Environment Management Systems. The workshop report emphasized the importance of the health safety and environment management system in the Arctic. A guideline is issued for the offshore oil and gas industry regarding Arctic operation. Safety culture is also emphasized(Arctic Council 2017-2019). Two meetings of the Arctic Shipping Best Practice Information Forum were held in 2017 and 2018. The Forum promotes public-private partnership among industry, Governments, International Regulators, the Research Community, the indigenous community, and international organisations, to identify and gather information to support safe and environmentally responsible Arctic Shipping. The Forum plans to develop a web portal, hosted by the PAME, which will assist in the process for the effective implementation of the Polar Code. It was concluded that the Forum does not provide regulatory information nor does it seek to develop or initiate Best Practice Procedures from within. The Forum is a body to collect and disseminate information that has proven pertinent to or accepted by the Forum as best practice is made available for users to apply at their own discretion (Protection of the Arctic Marine Environment 2017). The web portal will provide information including hydrography, meteorology, ice data, crew training, search and rescue, communication requirements, industry guidelines, traditional and local knowledge, ecological knowledge, operational understanding, ship equipment, system and structure, waste management.

Maritime occupational health and safety instruments: a Canadian perspective

(1) Maritime Jurisdiction

Occupational health and safety is a shared responsibility between federal and provincial governments in Canada. In terms of the work activities in the Canadian Arctic waters, depending on its nature, it may fall under either federal or provincial jurisdiction. Cargo and passenger shipping is subject to the federal jurisdiction, while fishing is primarily subject to provincial regulations. The Canada Shipping Act, 2001 have set up various legislative objectives, including protection of health and well-being of people participating in marine transportation, promotion of safety in marine transportation, protection of the marine environment from damage due to shipping activities, promote marine transportation efficiency,

developing regulations encouraging effective and economical marine transportation, encouraging the harmonization of marine practices, establishing effective inspection and enforcement program.

Under the Canada Shipping Act, 2001, Arctic Shipping Safety and Pollution Prevention Regulations were promulgated in 2017, to implement safety measures and anti-pollution measures of shipping in polar waters. Ice strengthening measures, ice navigator qualification are required for ships navigating in the Arctic waters. In addition, lifesaving equipment is required to protect individuals from cold weather or fitted with means to prevent the temperature from dropping below -30 °C. Engines, cooling systems, fuel systems and starting systems of lifeboats, rescue boats protected from the cold weather or fitted with means to prevent their temperature below – 15 °C.

Although the Polar Code safety measures are not applicable to fishing vessels, in the Canadian Arctic Shipping Safety and Pollution Prevention Regulations, requirements of safety navigation period, ice strengthening and ice navigator are also applicable vessels above 300 GT, including fishing vessels.

In addition to the specific rules in the Arctic Shipping Safety and Pollution Prevention Regulations, Canada Shipping Act, Marine Personnel Regulations, Fishing Vessel Safety Regulations, and Safe Working Practices Regulations all provide general requirements related to marine safety and training standards. At the federal level, there are several legal instruments which address operational safety and occupational safety issues related to fishing vessels. In terms of crew qualification and competency, the Marine Personnel Regulations and Fire and Boat Drill Regulations are two major standards ensure fishing crew are able to operate the vessel safely. In terms of work space safety, the Fishing Vessel Safety Regulations, Safe Working Practices Regulations and Maritime Occupational Health and Safety Regulations are the standards to ensure safe working environment on the fishing vessel.

(2) Labour Jurisdiction

At the federal level, in addition to the Canada Shipping Act and its regulations, Canada Labour Code Part II and Maritime Occupational Health and Safety Regulations are also important legislations in regulating OHS on Canadian ships. The *Canada Labour Code* and *Maritime Occupational Health and Safety Regulations*, provide standards for health and safety equipment, crew accommodation, first-aid requirements on board, hazard prevention, and violence prevention. To optimise OHS inspection, in 1998, a memorandum between Human Resources Development Canada (HRDC) and Transport Canada was signed to authorise Transport Canada to carry out OHS inspections on board Canadian ships.[42]

Unlike the *Canada Shipping Act*, which can be applicable to fishing vessels, the Canada Labour Code and Maritime Occupational Health and Safety Regulations are not applicable to fishing workers. Fishing workers are subject to different provincial occupational health and safety acts.The legislations regarding fishing occupational health and safety standards are highly unbalanced in Canada. All provinces have their own occupational health, safety and workers compensation legislation which is applicable to workers within the province or territory. This legislation does not in itself make the distinction between federal and provincial matters. Some provincial legislation includes provisions that apply to operations on water, for example life jacket requirements in the Nova Scotia Occupational Safety General Regulations, and extensive provisions addressing fishing operations in the British Columbia Occupational Health and Safety Regulation.

In this legislative context, the overlaps of federal and provincial legislations are inevitable. In R v Mersey Seafoods (Crown against Mersey Seafoods), a case decided by the Nova Scotian Court of Appeal, is a case on point. Mersey seafoods is owner of sea-going fishing vessels, including Mersey Venture, a factory freezer shrimping trawler, about 60 meters long and 2300 gross tonnage and has 27 crew. The port of registry is in Nova Scotia, but it fishes from shore to the Greenland coast, about 1500 nautical miles at sea and time at sea is between 30 and 50 days. In 2005 the provincial crown charged Mersey seafoods with eight counts of alleged violations of Nova Scotia's Occupational Health and Safety Act, including failures to provide and ensure the use of a personal floatation device, to supply fresh air, establish occupational health and safety policy, program and joint occupational health and safety committee. Mersey seafoods made a preliminary motion for dismissal of the charges, based on the that the matter the charges is within federal jurisdiction and provincial OHS act is not applicable because of inter-

jurisdictional immunity or inoperative for paramountcy. The key question to determine in the dispute was whether safety aboard fishing vessels, in pith and substance, as an essential party of the management of ship, is a federal undertaking immunized from the provincial OHS Act, or subject to provincial regulation.

At the first trial, the Provincial Court judge gave an oral decision quashing the charges. He said:

> An examination of the Canada Labour Code and the Marine Occupational Health and Safety Regulations made thereunder, the Canada Shipping Act and the Safe Working Practises Regulations, the Tackle Regulations and the Large Fishing Vessel Inspection Regulations all make it clear that the Federal Government is attempting to regulate workplace safety aboard vessels.
>
> In fact, Section 2 of the Canada Labour Code defines Federal work as including a work that is carried on, for, or in connection with navigation and shipping. And it is hard to imagine that that definition is not intended to cover the work carried out upon the Mersey Venture as a factory freezer trawler.

The provincial court judge confirmed that fishing occupational health and safety is a matter subject to federal regulation, in particular section II of the Canada Labor Code.

The crown appealed. The Court of Appeal held a different opinion from the provincial court judge, and they found that

> The provincial Crown does not sue Mersey Seafoods in tort. There is no issue of maritime negligence law. This is a prosecution under a provincial occupational health and safety statute. Occupational health and safety legislation has its own genealogy, rooted in neither maritime law nor tort.

They concluded that

> As Mersey seafoods, …, is a provincial undertaking, Part II of the Canada Labour Code and Maritime Occupational Safety and Health Regulations are replaced by Nova Scotia's OHS Act. But that substitution does not change the federal purpose – the Canada Shipping Act does not aim to exclude occupational health and safety legislation. Nova Scotia's OHS Act does not frustrate any federal statutory purpose.

The crown's appeal was allowed.

The Nova Scotian Court of Appeal's judgement, R v Mersey Seafoods (Crown against Mersey Seafoods), reconfirms the application of provincial occupational health and safety regulations into the fishing sector. However, this province-based fishing occupational health and safety standards for fishing workers are imbalanced. For example, only two provinces, British Columbia and Newfoundland and Labrador have workplace legislation, specific to fishing vessels. The remaining provinces apply general workplace legislation to fishing vessels. New Brunswick and Prince Edward Island, although taken certain efforts to develop awareness tools, still not expressly ascertain provincial OHS jurisdiction over fishing vessels(Transport Safety Board 2017).For Arctic fishing OHS regulations, province-based regulations may not be effectively harmonized with international maritime safety and health standards in the polar waters.

Conclusion:future challenges in developing CanadianArctic Maritime OHS regulations

In the Canadian Arctic, cargo shipping, passenger shipping and fishing activities are all increasing during the past decade.At the international level, maritime safety and health standards are gradually being developed by the International Maritime Organisation and International LabourOrganisation for seafarer and fishers. For seafarers and fishers working in polar waters, including Canadian Arctic region, special safety training and protection standards having been developed for seafarers, with a tendency to cover fishing vessels and fishers in polar waters as well.

At the Canadian national level, the current maritime OHS regulations involve both of the federal and provincial jurisdictions. Fishing OHS regulations are subject to imbalanced development of different

provinces, which may become regulatory barriers for Arctic fishers' equivalent OHS entitlements to seafarers in Canada.

Fishing occupational health and safety, in particular in the Arctic region, is a complicated issue involving vessel safety (construction and equipment), operations (navigation, fishing), and fishing crew's competence. Current Canadian province-based fishing OHS regulatory approach, compared to federal regulatory approach, have weakness in addressing maritime technical standards related to fishers. In this paper, we argue functional equivalence of health and safety protection for seafarers and fishers is a desirable aim. The international legislative tendency of the Polar Code Phase II and Work in Fishing Convention indicatesthe international efforts to promote functional equivalent health and safety protection among maritime workers. Transport Canada has many decades of regulatory experience in regulating maritime safety. In the near future, when Polar CodePhase II will be adopted or Canada will ratify the Work in Fishing Convention, revising fishing OHS regulations in each province and territory would inevitably create huge regulatory costs. Meanwhile, it will also increase compliance difficulties for fishing enterprises. What might be worse, the inconsistent OHS standards may cause uneven playfields for fishing operators, and Canadian fishing workers do not have equal legal protection.Therefore, we suggest a functional equivalent regulatory approach to promote protection of maritime workers, seafarer and fishers, either incorporate Arctic commercial fishing OHS regulations under Federal jurisdictions,or federal government and provincial governments reach a Memorandum of Understanding on fishing OHS standards in Canadian Arctic Waters. Further studies will be needed to evaluate which option would be more feasible in Canada to achieve effective and functionally equivalent OHS protection over maritime workers in Canadian Arctic Waters.

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