
An Orchestrated Governance Approach: Tracing the International Maritime Organization's Development and Adoption of the Polar Code

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KEYWORDS

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ABSTRACT

The increase in Arctic maritime traffic induced by climate change has prompted the International Maritime Organization (IMO) to develop and adopt the International Code for Ships Operating in Polar Waters (Polar Code). While previous research on the governance of the IMO in the Arctic has addressed topics such as plastic waste management, the normative influence of international bureaucracies, and the implementation of the Polar Code from state and industrial perspectives, no study has specifically applied the concept of orchestration to Arctic maritime shipping and the development and adoption of the Polar Code. This paper seeks to fill this gap by using orchestration as an analytical framework to examine how the IMO orchestrated the development and adoption of the Polar Code, especially in response to climate-induced challenges. The analysis draws on documents from the IMO and Arctic Council (AC), along with previous research on Arctic shipping. Qualitative discourse analysis and process tracing are used to explore the data. Findings suggest that the IMO's orchestration was facilitated by its recognized leadership in maritime governance, but was constrained by capability deficits in Arctic-specific issues. The organization navigated divergent stakeholder interests and sovereignty concerns by engaging the AC and Arctic states as key intermediaries. Orchestration enabled the creation of a comprehensive regulatory framework balancing safety, environmental protection, and commercial interests. However, the article also reveals limitations in addressing critical issues such as the use of heavy fuel oil. These findings contribute to the array of empirical evidence on transnational environmental governance and the evolving regulatory landscape in polar regions.



I. Introduction

As Arctic waters become more navigable due to rapid climate-induced warming and sea ice decline, maritime traffic has increased, thus creating a need for new regulations. Established by the 1948 United Nations Maritime Conference as the United Nations (UN) specialised agency for regulating international shipping, the International Maritime Organization (IMO) has played a pivotal role in addressing this challenge through the development and adoption of the International Code for Ships Operating in Polar Waters (the 'Polar Code'). Research on the governance of the IMO in the Arctic has explored various themes, including the governance of plastic waste¹ and the normative influence of international bureaucracies.² Numerous studies have examined how the Polar Code is implemented in Arctic maritime shipping from both state and industrial perspectives.³ While previous research has examined the IMO's orchestration efforts in the environmental governance of maritime shipping in a broader context,⁴ no study has applied orchestration within the context of Arctic maritime shipping as well as the development and adoption process of the Polar Code. This paper addresses this gap by exploring the research

question: "how has the IMO orchestrated the development and adoption of the Polar Code in response to climate change?"

To address this question, this paper employs orchestration as an analytical framework which explains how intergovernmental organizations (IGOs) leverage intermediaries to govern target actors toward their desired outcomes when they lack direct authority. It argues that the IMO's success in developing and adopting the Polar Code stems from its recognized leadership in maritime governance, though constrained by Arctic-specific capability deficits. By engaging the Arctic Council (AC) and Arctic states as key intermediaries, the IMO effectively balanced safety, environmental protection, and commercial interests.⁵ However, critical gaps remain, particularly regarding heavy fuel oil (HFO) use. This paper primarily relies on document analysis to examine conventions, codes, amendments, and resolutions from the IMO and the AC. Additionally, it considers previous academic research, including scholarly articles and research papers on maritime safety, environmental protection, and Arctic shipping. The data are examined using qualitative discourse analysis, with findings interpreted through the lens of

¹ Cowan, Emily, et al. "Orchestration within Plastics Governance – From Global to Arctic." *Marine Pollution Bulletin*, vol. 197, Dec. 2023, p. 115635.

² Odgaard, Liselotte, and Kathryn C Lavelle. "The Arctic Council, the International Maritime Organization, and the Polar Code." *Environment and Security*, vol. 1, no. 3–4, May 2023, pp. 103–20.

³ Hartmann, Jacques. "Regulating Shipping in the Arctic Ocean: An Analysis of State Practice." *Ocean Development & International Law*, vol. 49, no. 3, June 2018, pp. 276–99; Bogнар-Lahr, Dorottya. "In the Same Boat? A Comparative Analysis of the Approaches of Russia and Canada in the Negotiation of the IMO's Mandatory Polar Code." *Ocean Development and International Law*, vol. 51, no. 2, Nov. 2019, pp. 143–61; Chircop, Aldo, and Miriam Czarski. "Polar Code Implementation in the Arctic Five: Has Harmonisation of National Legislation Recommended by AMSA Been Achieved?" *Polar Journal*, vol. 10, no. 2, Jul. 2020, pp. 303–21; Fedi, Laurent, et al. "Mapping and Analysis of Maritime Accidents in the Russian Arctic through the Lens of the Polar Code and POLARIS System." *Marine Policy*, vol. 118, Aug. 2020, p. 103984; Hebbar, Anish Arvind, et al. "The IMO Regulatory Framework for Arctic Shipping: Risk Perspectives and Goal-Based Pathways." *Springer Polar*

Sciences, 2020, pp. 229–47; Karahalil, Meriç, et al. "Polar Code Application Areas in the Arctic." *WMU Journal of Maritime Affairs*, vol. 19, no. 2, May 2020, pp. 219–34; Engtrø, Espen. "A Discussion on the Implementation of the Polar Code and the STCW Convention's Training Requirements for Ice Navigation in Polar Waters." *Journal of Transportation Security*, vol. 15, no. 1–2, Apr. 2022, pp. 41–67; Browne, Thomas, et al. "A Method for Evaluating Operational Implications of Regulatory Constraints on Arctic Shipping." *Marine Policy*, vol. 135, Jan. 2022, p. 104839.

⁴ Lister, Jane, et al. "Orchestrating Transnational Environmental Governance in Maritime Shipping." *Global Environmental Change*, vol. 34, Sept. 2015, pp. 185–95.

⁵ The Arctic Council (AC) is a high-level intergovernmental forum established in 1996 to promote cooperation among Arctic states and indigenous communities on sustainable development and environmental protection in the Arctic region through consensus-based decision-making. The Arctic states are the eight countries with territorial claims or significant interests in the Arctic region: Canada, Denmark (including Greenland), Finland, Iceland, Norway, Russia, Sweden, and the United States (via Alaska).

orchestration. Process tracing is used to identify the IMO's orchestration approach in developing and adopting the Polar Code in coordination with suitable intermediaries.

While acknowledging the involvement of various stakeholders, such as Indigenous communities, the primary focus of this paper is on the IMO's orchestration efforts in the development and adoption process of the Polar Code to provide a comprehensive analysis of the IMO's strategies, capabilities, and challenges in navigating complex stakeholder dynamics. As a result, the paper does not explore the roles of other actors in depth. Moreover, while both the Arctic and Antarctic regions are governed by the Polar Code for shipping, this paper concentrates on the Arctic. Unlike Antarctica, which is an uninhabited continent surrounded by ocean and used solely for scientific research stations, the Arctic is an ocean covered by ice caps, surrounded by sovereign states, and inhabited by indigenous populations who have lived there for over 10,000 years with diverse cultures, languages, and traditions.⁶ These fundamental differences shape distinct maritime operational contexts and governance needs, as the Arctic operates under a more decentralised and fragmented governance framework. The Arctic is overseen by the AC, which is a soft law regime that can only make advisory recommendations with multiple overlapping treaties and agreements.⁷ In contrast, Antarctica is managed under the Antarctic Treaty System, a legally binding framework widely accepted internationally since the mid-twentieth century.⁸ These complexities in the Arctic,

particularly its reliance on soft-law mechanisms, make it a particularly compelling test case for orchestration.

The article proceeds in four additional Sections. Section II expands on the climate change implications for Arctic maritime governance to provide context for understanding the necessity of the Polar Code in addressing these climate-induced challenges. Section III reviews orchestration and applies it to Arctic maritime governance. Section IV discusses the hypotheses that have guided the development and adoption of the Polar Code. Section V concludes with some reflections.

II. Climate Change and its Implications for Arctic Maritime Governance

A. Climate Change and Rapid Environmental Shifts in the Arctic: Opportunities and Challenges

The Arctic is warming at a rate that is approximately four to seven times faster than the global average.⁹ This rapid warming has resulted in a significant decline in the extent and thickness of sea ice in the Arctic.¹⁰ Specifically, satellite observations since 1979 show that the September sea ice minimum has declined by approximately 13 percent per decade.¹¹ As a result, new shipping routes, such as the Northern Sea Route (NSR) along Russia's Arctic coast and the Northwest Passage (NWP) through the Canadian archipelago, are becoming more accessible. This trend is evidenced by a rise in ship traffic across the Arctic. Over the past decade, ship numbers in the region have surged by 37 percent, and the total distance sailed by all

⁶ Lennon, Erika. "A Tale of Two Poles: A Comparative Look at the Legal Regimes in the Arctic and the Antarctic." *Sustainable Development Law and Policy*, vol. 8, no. 3, 14, 2008, pp. 32–36; Stephen, Kathrin. "The Arctic vs. Antarctic—The Two Poles (Not) Compared." *The Arctic Institute—Center for Circumpolar Security Studies*, 22 Jan. 2024. As of 2020, the Arctic is home to approximately 4 million people, about 10 percent of whom are indigenous. Antarctica has no permanent population, hosting only 1,000–4,000 scientists in temporary settlements at 85 research stations. Moreover, each region has a distinct climate conditions with temperatures ranging from -15 to -20°C in the Arctic and -50 to -57°C in Antarctica.

⁷ Such as the United Nations Convention on the Law of the Sea (UNCLOS), the 1973/78 International Convention for the Prevention of Pollution from Ships (MARPOL), and the Polar Bear Treaty; see Lennon (n 6) *supra*.

⁸ *ibid*.

⁹ Somerville, Paul, and Maxime Marin. "The Arctic is Warming Four Times Faster than the Global Average." *Risk Frontiers*, 12 Apr. 2023.

¹⁰ Sumata, Hiroshi, et al. "Regime Shift in Arctic Ocean Sea Ice Thickness." *Nature*, vol. 615, no. 7952, Mar. 2023, pp. 443–49.

¹¹ NASA Global Climate Change. "Arctic Sea Ice Minimum Extent." *Climate Change: Vital Signs of the Planet*.

vessels has increased by an impressive 111 percent.¹² Specifically, the number of ships in the Arctic has risen from 1,298 in 2013 to 1,782 in 2023, which signals a steady upward trend.¹³ Notably, fishing vessels made up 41 percent of all ships in the region in 2023, while other vessel types¹⁴ are also becoming increasingly common.¹⁵

These developments present significant economic opportunities, particularly in shipping and resource extraction. The NSR, for example, could reduce the travel distance between Europe and Asia by approximately 8,000 kilometres.¹⁶ This offers an alternative to traditional shipping lanes such as the Red Sea and the Suez Canal, especially when these have become increasingly costly and associated with security risks.¹⁷ Additionally, the Arctic is estimated to hold about 13 percent of the world's untapped oil and 30 percent of its natural gas.¹⁸ The melting sea ice is also exposing an estimated USD 1 trillion worth of metals and minerals.¹⁹ As these resources become more accessible, the region has attracted increased investment in oil and gas exploration. Currently, the Arctic supplies 10 percent of the world's commercial oil and 25 percent of its natural gas.²⁰ With key basins such as the Kronprins Christian and Baffin Bay becoming future targets for extraction, the region's economic potential continues to grow.

However, these developments come with significant environmental challenges. One major concern is the risk of oil spills, which could be catastrophic in the Arctic's fragile ecosystem, given the difficulty of responding to accidents in such remote and harsh conditions. Additionally, many vessels rely on HFO, which produces high levels of black carbon and other pollutants. Operational discharges of chemicals, untreated 'grey water',²¹ and garbage further threaten Arctic waters, while the introduction of invasive species through ballast water or hull fouling poses risks to native ecosystems.

In particular, black carbon emissions from ships can accelerate local warming by reducing ice albedo.²² Estimates suggest that black carbon has a warming impact that is seven to ten times greater when deposited on snow or ice compared to its effect on the atmosphere.²³ Although shipping only accounts for about 2 percent of black carbon emissions in the Arctic, its impact is disproportionately high because the particles are emitted at low altitudes and are more likely to settle on ice and snow.²⁴ The increased use of HFO, which emits high levels of black carbon, also worsens this issue, with emissions from Arctic shipping rising by 85 percent between 2015 and 2019.²⁵ As sea ice continues to melt, opening up new shipping routes, this vicious cycle of warming and ice loss may continue unless stricter regulations on fuel types and emissions are implemented.

¹² *The Increase in Arctic Shipping 2013-2023: Arctic Shipping Status Report (ASSR) #1*. The Arctic Council Working Group on the Protection of the Arctic Marine Environment (PAME), Jan. 2022.

¹³ *ibid.*

¹⁴ Including cruise ships, bulk carriers, and private yachts.

¹⁵ PAME (n 12) *supra*; Raspotnik, Andreas. "Revisiting the Polar Code: Where Do We Stand?" *The Arctic Institute—Center for Circumpolar Security Studies*, 17 Jan. 2024.

¹⁶ *Shifting Ice: Russia's Increasing Reliance on the Private Sector and the PRC in the Arctic*. Strider Global Intelligence, 7 Feb. 2024.

¹⁷ Detsch, Jack, and Robbie Gramer. "Arctic Geopolitics: Russia and China Eye New Trade Routes in the High North." *Foreign Policy*, 30 May 2024.

¹⁸ This includes 90 billion barrels of oil, 1,669 trillion cubic feet of natural gas, and 44 billion barrels of natural gas liquids; see *Circum-Arctic Resource Appraisal*:

Estimates of Undiscovered Oil and Gas North of the Arctic Circle. USGS, 2008.

¹⁹ Cho, Renee. "What Lies Beneath Melting Glaciers and Thawing Permafrost?" *Columbia Climate School*, 13 Sept. 2022.

²⁰ "Oil and Gas." *Arctic Review*.

²¹ Wastewater from sinks, showers, and laundry.

²² When black carbon is emitted, it absorbs heat in the lower atmosphere, directly contributing to regional warming. As these particles settle on the Arctic's snow and ice surfaces, they reduce the albedo, or reflectivity, of these surfaces by making them to absorb more sunlight rather than reflect it.

²³ Prior, Sian. "How the Shipping Industry Can Halve Climate-Warming Black Carbon in the Arctic." *Climate Home News*, 18 Mar. 2021.

²⁴ *ibid.*

²⁵ *ibid.*

B. *The Polar Code: Adaptation to Climate Change and Ongoing Challenges*

The Polar Code was developed as a response to the increasing maritime risks posed by rapid Arctic climate change and the subsequent rise in polar shipping activity. As a comprehensive regulatory framework, it operates through amendments to three existing IMO conventions: the 1948 Safety of Life at Sea Convention (SOLAS), the 1973/78 International Convention for the Prevention of Pollution from Ships (MARPOL), and the 1978 International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers.²⁶ Through these amendments, the Polar Code aims to (i) ensure the maritime safety of ships, their crews, and passengers in harsh polar environments and (ii) protect the fragile polar regions from environmental hazards posed by increased shipping.

The Polar Code's structure reflects its dual focus on safety and environmental protection through a combination of mandatory and non-mandatory provisions. Part I focuses on maritime safety as a supplement to SOLAS²⁷ with two parts: mandatory safety measures (Part I-A) and additional guidance provisions²⁸ (Part I-B). Part II focuses on pollution prevention as a supplement to MARPOL to mitigate the environmental impact of increased Arctic and Antarctic shipping. Part II also includes mandatory pollution prevention measures²⁹ (Part II-A) as well as

non-binding guidance provisions (Part II-B) on various environmental practices.³⁰

The Polar Code implements these provisions through specific operational requirements tailored to the unique challenges of polar navigation. As sea ice conditions change, ships must be designed to handle varying ice conditions and extreme weather events. To mitigate the environmental impact of increased shipping in sensitive polar ecosystems, the Polar Code enforces stricter regulations on discharges and emissions. It also mandates enhanced safety and specialised training requirements to prevent accidents in remote areas and ensure that crews are well-prepared to face the challenges of polar navigation in a rapidly changing environment.

While the Polar Code represents a significant step forward in maritime safety and pollution prevention, it faces ongoing challenges. First, the current version does not fully account for climate-induced environmental impacts such as unusual storms and atmospheric rivers, which are becoming more frequent in polar regions.³¹ Second, the rapid pace of environmental change in the Arctic and Antarctic may necessitate more frequent updates to the Polar Code than initially anticipated.³² Third, the Polar Code represents a compromise between commercial and environmental concerns. For example, while it makes amendments to MARPOL to make

²⁶ International Convention for the Safety of Life at Sea (adopted 1 Nov. 1974, in force 25 May 1980) 1184 UNTS 2 (SOLAS); International Convention for the Prevention of Pollution from Ships (adopted 2 Nov. 1973) 1340 UNTS 184, as amended by the Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships (adopted on 17 Feb. 1978, in force on 2 Oct. 1983) 1340 UNTS 61 (MARPOL); International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (adopted 7 Jul. 1978, entered into force 28 Apr. 1984) 1361 UNTS 190.

²⁷ The Polar Code is further supported by a new SOLAS Chapter XIV concerning safety measures around design, equipment, operations, and manning for ships operating in polar waters.

²⁸ Guidance provisions in Part I-B are meant for ship owners and operators to provide details on how to comply with mandatory measures in Part I-A.

²⁹ These measures include legally binding provisions covering various aspects of managing maritime pollution, including oil (Annex I), noxious liquid substances carried in bulk (Annex II), sewage (Annex IV), and garbage (Annex V).

³⁰ Part II-B includes suggestions on how ship owners and operators can further reduce their environmental impact in polar areas by using safer materials such as eco-friendly oils or water-based coatings on underwater hulls; managing waste and harmful substances such as noxious liquid substances, animal carcasses, ballast water, and biofouling; and following voluntary restrictions such as the ban on heavy fuel oil used in polar waters.

³¹ Uryupova, Ekaterina. "Climate Change and Challenges of Navigation in the Arctic: How Safe are We?" *The Arctic Institute—Center for Circumpolar Security Studies*, 30 Apr. 2024.

³² Raspotnik (n 15) *supra*.

certain environmental provisions mandatory, it does not ban the use of HFO, which remains a significant environmental concern. This compromise highlights the ongoing tension between facilitating Arctic shipping development and ensuring robust environmental protection.

These challenges underscore the dynamic nature of Arctic maritime governance and the need for continued evolution of the Polar Code's regulatory framework. As both environmental conditions and shipping patterns continue to change, the ability to adapt and strengthen these regulations while maintaining effective implementation becomes increasingly critical for a sustainable Arctic maritime shipping future.

III. The Analytical Framework: Orchestration

Orchestration has emerged as a significant analytical framework for understanding forms of indirect governance as it offers insights into how IGOs can influence the policies and behaviours of target actors indirectly, without direct authority.³³ At its core is the Orchestrator-Intermediaries-Target (O-I-T) model. In this model, the Orchestrator (typically an IGO) works through Intermediaries³⁴ when facing capability deficits or complex stakeholder dynamics by providing them with ideational and / or material support to govern Target actors³⁵ in pursuit of IGOs' governance goals.³⁶ This soft governance approach allows the Orchestrator to coordinate voluntary action without relying on hierarchical authority or hard-law binding agreements, which has been found to enhance

the support for and shape of regulations and their compliance.³⁷

In the context of Arctic maritime governance, the IMO, as the Orchestrator, faced three challenges in developing and adopting the Polar Code: regulatory competence, operational capacity, and legitimacy. These constraints led the IMO to adopt an orchestration approach, working through Intermediaries such as the AC and Arctic states, to govern Target actors (ship owners and operators) in pursuit of a sustainable Arctic maritime shipping future.³⁸

Orchestrator	Intermediaries	Target
IMO	AC, Arctic States	Ship owners and operators

Table 1: Overview of O-I-T for developing and adopting the Polar Code for Arctic Maritime Governance adapted from Abbott et al.³⁹

The paper proposes six hypotheses to guide the analysis, which are divided into two groups. The first group, assessing the IMO's governance capabilities and authority in general terms, includes the following four hypotheses:

- H1—Orchestrator Focality: The IMO, as a recognized leader in maritime safety and environmental protection, can more easily orchestrate.
- H2—Orchestrator Capabilities: The IMO orchestrates because it has moderate capability deficits (limited governance capabilities) in regulating maritime safety and environmental protection in the polar regions.
- H3—State Oversight: The IMO has more autonomy in low politics of safe

³³ Abbott, Kenneth W, et al. "Two Logics of Indirect Governance: Delegation and Orchestration." *British Journal of Political Science*, vol. 46, no. 4, July 2015, pp. 719–29. Notable examples include the European Union (EU) leveraging on the Body of European Regulators for Electronic Communications (BEREC) for regulatory guidance, the United Nations Environment Programme (UNEP) and the United Nations Global Compact (UNGC) collaborating to develop and adopt the Principles for Responsible Investment (PRI), and the World Health Organization (WHO) engaging in public-private partnerships such as those with the Gates Foundation.

³⁴ Such as non-governmental organizations, business organizations, public-private partnerships, trans-governmental networks, and other IGOs.

³⁵ States or private entities.

³⁶ Abbott, Kenneth W, et al. "Orchestration: Global Governance through Intermediaries." *Social Science Research Network*, Jan. 2012.

³⁷ Cowan (n 1) *supra*.

³⁸ This goal encompasses: (i) ensuring maritime safety in harsh polar environments, (ii) protecting fragile polar ecosystems from increased shipping activity, and (iii) balancing economic opportunities with environmental conservation.

³⁹ Abbott et al. (n 36) *supra*.

ship operations and the protection of the polar environments compared to core areas of national sovereignty.

- H4—Orchestrator Entrepreneurship: The IMO encourages the development of new measures to meet the Polar Code's high standards.

The second group, focusing on the IMO's orchestration efforts in developing and adopting the Polar Code, includes the remaining two hypotheses:

- H5—Goal Divergence: The IMO orchestrates when there is a divergence of goals among different Arctic stakeholders.
- H6—Intermediary Availability: The IMO orchestrates when suitable intermediaries with a correlated goal of a sustainable Arctic maritime shipping future and complementary capabilities exist.

IV. Discussion

A. *The General Governance Capabilities and Authority of the IMO as an Orchestrator*

The IMO's recognized leadership in maritime safety and environmental protection significantly facilitated its orchestration of the Polar Code. First, as discussed in Section II.B, the IMO has adopted various conventions and regulations related to maritime safety and environmental protection. Second, the IMO oversees the Convention on Facilitation of International Maritime Traffic (FAL), which demonstrates its dedication to preventing unnecessary maritime traffic delays and promoting procedural uniformity. Third, rapid climate-induced warming and sea ice decline created an urgent need for new shipping regulations. The IMO leveraged this shared concern to bring together the AC, Arctic states, and ship owners and operators to develop and adopt the Polar Code. Given these factors, the IMO is the natural focal point for developing Arctic shipping regulations, which supports H1.

Despite its leadership position, the IMO faces challenges in directly regulating maritime safety and environmental protection due to its limited governance capabilities, particularly

in the context of the Arctic. The existing IMO instruments such as SOLAS and FAL are not sufficiently designed to address the risks and conditions associated with shipping operations in remote, ice-covered polar waters. For example, issues such as operating on ice, extremely cold temperatures, high latitude navigational challenges, and the lack of emergency response infrastructure are not sufficiently covered in these instruments. These technical limitations are compounded by governance challenges. Despite the increase in HFO consumption and greenhouse gas emissions from shipping, no binding agreements on these emissions were made between 1997 and 2011, and the use of HFO remains unprohibited.

Additionally, the IMO's governance capabilities were particularly constrained by its institutional relationship with the AC. Although the Polar Code came into force in 2017, it was not until 2019 that the AC recognised the IMO as an observer. The granting of observer status in 2019 formalised the relationship between the IMO and the AC, yet this delayed formal recognition affected (i) the legitimacy of the IMO and the Polar Code, and (ii) the ability of the IMO and the AC to work together on issues related to maritime safety and environmental protection in polar waters. Hence, the IMO had to rely on the voluntary collaboration of the AC and Arctic states in developing and adopting the Polar Code due to its moderate capability deficit, which supports H2.

Combining binding agreements under hard law with advisory provisions under soft law, the structure of the Polar Code reflects a balance between IMO authority and state sovereignty. The Polar Code includes mandatory measures covering safety (Part I-A) and pollution prevention (Part II-A), where the IMO has the authority to compel state compliance. However, many provisions are non-mandatory (Parts I-B and II-B), which means that their effectiveness relies on voluntary compliance by ship owners and operators. This indicates limits on IMO autonomy, especially when regulations border

on sovereignty issues. Decisions on implementation measures are taken at the national level, which points to sovereignty boundaries constraining IMO oversight into core state functions and thus supports H3.

The IMO's entrepreneurial approach is also demonstrated in this structure. This approach enables flexible updates to recommendations as new climate-induced challenges emerge while maintaining regulatory consistency for maritime operations in polar waters. Specifically, under Part I-A, ship owners and operators are required to perform an operational assessment around design and construction, equipment, operational, and manning measures to determine the limitations of operating in their specific polar regions. The IMO stipulates high standards, but the responsibility is on the owners and operators to develop measures to meet these standards.⁴⁰ This structure encourages ship owners and operators to innovate tailored solutions for their vessels to operate in polar regions and to meet the Polar Code's high standards. This approach to fostering innovation extends beyond immediate compliance; it facilitates adaptation to new technologies and evolving conditions, particularly in response to climate change. Progress is already underway to expand the Polar Code's mandate to fishing and small vessels, pushing more ship owners and operators to devise innovations that meet standards.⁴¹ All of these factors support H4.

The IMO's entrepreneurial orchestration does not completely fit with the one indicated by Abbott et al.'s suggestion that orchestrator actors will orchestrate more when organisational structure and culture encourage policy entrepreneurship and risk-taking.⁴² Yet, it is argued that, rather than by direct policy innovation, the IMO drives entrepreneurship by creating conditions that compel ship owners and operators to develop

innovative solutions to meet regulatory requirements. By setting high benchmarks while adopting a flexible and entrepreneurial approach, the IMO drives ship owners and operators to continually push for new technological and operational solutions. This modified understanding of entrepreneurship not only supports H4 but also acknowledges its unique manifestation in the IMO context. The IMO's success in fostering innovation through regulatory frameworks rather than direct policy intervention represents an important evolution in our understanding of institutional entrepreneurship in international maritime governance.

B. *The IMO's Orchestration Efforts in Developing and Adopting the Polar Code*

The development of the Polar Code was a comprehensive process. In 1993, Canada led an external working group that produced the first draft code in 1998.⁴³ Building on this initial work, the IMO adopted voluntary Arctic guidelines for ships in 2002, which were expanded to cover all polar waters by 2010. Despite these measures, the Arctic states acknowledged the need for mandatory rules and regulations.⁴⁴ Additionally, in 2009, the AC conducted the Arctic Marine Shipping Assessment (AMSA), which explicitly called for the IMO to develop a mandatory Polar Code. This unified position from Arctic states and the AC set the stage for formal negotiations toward binding regulations.⁴⁵

The path to mandatory regulations, however, revealed deeply divergent interests among stakeholders. While the IMO's primary goals were to develop and adopt consistent minimum standards for ensuring safe maritime operations and protecting the polar environments, other stakeholders had varying perspectives.⁴⁶ For example, Russia adopted a more isolated stance by prioritising the protection of its shipping interests to minimise costs. This was demonstrated by its

⁴⁰ Brigham, Lawson. "The IMO Polar Code: Safety and Environmental Protection for Polar Waters. Proceedings: January 2024 Vol. 150/1/1,451." *U.S. Naval Institute*, 31 Dec. 2023.

⁴¹ *ibid.*

⁴² Abbott et al. (n 36) *supra*.

⁴³ Brigham (n 40) *supra*.

⁴⁴ *ibid.*

⁴⁵ *Arctic Marine Shipping Assessment: 2009 Report*. Arctic Council, 2009.

⁴⁶ Odgaard and Lavelle (n 2) *supra*.

efforts to seek exemptions from discharge bans for some of its vessels or limit its construction costs related to reception facilities.⁴⁷ Environmental non-profit organizations advocated for prohibitions on HFO usage and sewage / grey water discharges given the Arctic's low tolerance for pollution.⁴⁸ Non-Arctic states focused on enabling access and transit rights while showing enthusiasm for environmental protection.⁴⁹

The formal negotiation process began in 2011 when the IMO's Marine Environment Protection Committee and Maritime Safety Committee initiated discussions for a mandatory Polar Code. Key negotiators included Canada, Norway, the United States, and Russia. The Arctic states actively pursued the Tromsø Ministerial Meeting and AMSA Report recommendations to cooperate in the development of the Polar Code from 2009 to 2015.⁵⁰ These states also made numerous submissions, with Canada, Norway, Russia, and the US making the most extensive documentary contributions.⁵¹ Moreover, the AC's Protection of the Arctic Marine Environment (PAME) working group provided input and recommendations during the IMO negotiations between 2010 and 2013.⁵² This enabled the IMO to align the Polar Code with existing AC environmental protection efforts and the interests of Arctic states. The AC and its working groups helped build consensus among Arctic states and stakeholders on the need for mandatory shipping regulations in polar waters years before the adoption of the Polar Code.

The success of the Polar Code's development heavily relies on the IMO's engagement of intermediaries, particularly the AC and Arctic states. These intermediaries play a crucial role in bridging the gaps between competing interests, as they not only share the common

goal of a sustainable Arctic maritime shipping future but also possess governance capabilities such as local information, technical expertise, enforcement capacity, legitimacy, and direct access to Arctic stakeholders—capabilities the IMO lacks. The AC's role was especially important as it represented both the collective voice of Arctic states and Indigenous communities, even though individual Arctic states occasionally expressed different views based on their national interests during negotiations. This divergence of interests increased the IMO's ability to orchestrate a compromise solution without explicit approval from any one bloc. The final Polar Code represented a compromise between commercial and environmental concerns. For example, the Polar Code does not ban HFO usage while making amendments to MARPOL to make the environmental provisions of the Polar Code mandatory as shown in Part II-A.

Following the Polar Code's adoption in 2014 and its 2017 enforcement, the AC continued its intermediary role by developing the Arctic Shipping Best Practice Information Forum in 2017 to continue promoting implementation and compliance with the IMO regulations. This continued to integrate Arctic states, and ship owners and operators, to support IMO regulatory efforts for a sustainable Arctic maritime shipping future. The development process and outcome underscored the IMO's ability to orchestrate when stakeholders have divergent goals (H5) and the crucial role of effective intermediaries in successful orchestration (H6).

V. Conclusion

This paper has examined how the IMO orchestrated the development and adoption of the Polar Code through the lens of orchestration. The analysis, guided by six hypotheses, provides a comprehensive

⁴⁷ *ibid*; Bogнар, Dorottya. "Russia and the Polar Marine Environment: The Negotiation of the Environmental Protection Measures of the Mandatory Polar Code." *Review of European, Comparative and International Environmental Law*, vol. 27, no. 1, Mar. 2018, pp. 35–44.

⁴⁸ Odgaard and Lavelle (n 2) *supra*.

⁴⁹ Bai, Jiayu. "The IMO Polar Code: The Emerging Rules of Arctic Shipping Governance." *International Journal of Marine and Coastal Law*, vol. 30, no. 4, Nov. 2015, pp. 674–99.

⁵⁰ Chircop and Czarski (n 3) *supra*.

⁵¹ *ibid*.

⁵² Arctic Council (n 45) *supra*.

explanation of the IMO's orchestration in the development and adoption of the Polar Code.

The IMO's orchestration of the Polar Code was fundamentally shaped by its position as a focal point in maritime safety and environmental protection (H1). This established authority allowed the IMO to convene diverse stakeholders and lead the process of developing such regulations. However, the IMO's moderate capability deficits in specific issues (H2) necessitated a collaborative approach, driving the organization to engage with the AC and Arctic states as key intermediaries. The varying levels of state oversight (H3) influenced the structure of the Polar Code, resulting in a mix of mandatory and recommendatory provisions. This reflects the IMO's strategic navigation of state sovereignty concerns while pushing for comprehensive polar shipping regulations. The IMO's entrepreneurial approach (H4) in setting high standards while allowing flexibility in implementation encouraged innovation among ship owners and operators, demonstrating how orchestration can drive industry advancements.

This orchestration was made possible by the availability of suitable intermediaries (H6), namely the AC and Arctic states, who provided essential regional expertise and legitimacy to the process. The divergence of goals among Arctic stakeholders (H5) made the IMO's orchestration role crucial. By mediating between safety, commercial, and environmental interests, the IMO crafted a balanced solution in the Polar Code among various priorities.

A realist perspective suggests that Arctic states pursued the Polar Code largely out of their national interests concerning security, economic growth, and sovereignty. For instance, Russia's push for certain regulations may have reflected its commercial shipping priorities more than a collective aim. Nevertheless, despite these differences in national interests, there was a shared commitment among Arctic states to foster a sustainable future, as evidenced by their

general support for a binding Polar Code. This interplay between divergent national interests and shared goals aligns well with the concept of orchestration, which emphasises cooperation and collective action among diverse actors.

These hypotheses explain how the IMO was largely successful in orchestrating the development and adoption of the Polar Code. The IMO leveraged its authority and focality to lead the process while acknowledging its capability gaps and the need for collaboration. It navigated complex state oversight issues, encouraged industry innovation, mediated divergent stakeholder interests, and effectively leveraged intermediaries. This orchestration approach enabled the IMO to create a comprehensive and widely accepted set of regulations for Arctic shipping that would not have been achieved through direct regulation alone.

However, the need for consensus in this orchestration process led to compromises that may limit the Polar Code's effectiveness in addressing some critical issues. A prime example is the lack of a ban on HFO use in the Arctic, despite its significant environmental risks. While the Polar Code encourages ship owners and operators to apply the HFO ban, this remains a non-binding recommendation. This illustrates how orchestration, while effective in achieving agreement, may sometimes result in regulations that fall short of addressing the most pressing environmental concerns. As climate change accelerates in the Arctic, there may be a need for more rapid and stringent regulatory responses. Future orchestration efforts may need to find ways to balance consensus-building with the need for decisive action on critical issues. Furthermore, the effectiveness of the orchestration approach in ensuring compliance and enforcement remains to be seen. The IMO still lacks direct enforcement capabilities. The reliance on flag states and port states for implementation and enforcement could lead to inconsistencies in how the Polar Code is applied across Arctic regions.