FONASBA

YABA

Young Ship Agent or Shipbroker **Award 2025**

Recognising **excellence** in ship agency and shipbroking

Association of Ship Brokers & Agents (USA) Inc. Established 1934

ITIC Specialist Professional Indemnity Insurance

BIMCO

Barcelona Shipping Agents Association

Institute of Chartered Shipbrokers

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YOUNG AGENTS & BROKERS AWARDS (YABA) 2025

A NOTE FROM THE FONASBA PRESIDENT

It is with great pride and genuine warmth that I introduce the FONASBA YABA Book for the 2025 Competition.

Over the past two years, the YABA initiative has grown beyond our expectations—and, indeed, beyond our dreams. What began as a platform to encourage young professionals to share ideas has evolved into one of FONASBA's most respected and impactful initiatives, reflecting the strength, diversity, and future leadership of our global community.

This year's YABA Book stands as a powerful testament to the calibre of the next generation of ship agents and brokers. The quality, depth, and relevance of the contributions once again confirm that the future of our profession is in capable, thoughtful, and responsible hands.

In the words of Aziz Mantrach, Chairman of the YABA Review Committee, "Progress in our profession is shaped through discipline, integrity, and the conscious transfer of knowledge from one generation to the next." This sentence perfectly captures the spirit of YABA. The 2025 Book is not only a celebration of achievement, but also a bridge between experience and ambition, between today's challenges and tomorrow's solutions.

I wish to express my sincere appreciation to Aziz Mantrach and to all members of the YABA Review Committee, whose dedication, professionalism, and careful stewardship ensure the credibility and continued success of this initiative. Their commitment is the foundation upon which YABA continues to grow year after year.

My heartfelt thanks also go to our sponsors, whose support makes this programme possible, and to the FONASBA Secretariat, whose coordination, energy, and attention to detail consistently turn vision into reality. Their collective efforts have elevated YABA into a flagship project for our Federation.

Most importantly, I congratulate all participants and contributors to the 2025 YABA Book. Your work enriches our profession, challenges conventional thinking, and inspires confidence in the future of ship agency and shipbroking.

This book is more than a publication. It is a symbol of continuity, excellence, and belief—in our people, our values, and our shared future.

Fulvio Carlini
FONASBA President

INTRODUCTORY REMARKS

Chairman of the YABA Review Committee

Progress in our profession is shaped through discipline, integrity, and the conscious transfer of knowledge from one generation to the next. The YABA Book 2025 stands as a marker of that continuity, capturing a moment of celebration and a movement of purpose.

As Chairman of the YABA Review Committee and Past President of FONASBA, I approached this publication through the prism of FONASBA's enduring commitment to professional excellence, ethical conduct, and international cooperation. This book serves both as a record of achievement and as a forward-looking compass for our industry.

Throughout my years in maritime, I have learned that the resilience of our sector lies not solely in infrastructure or regulation, but in the calibre of the people who navigate its complexities. The YABA reflects this belief by recognising individuals who combine technical competence with vision, curiosity, and accountability. And I've had the privilege of witnessing the extraordinary quality of submissions; a testament to the vibrant, innovative minds rising within our industry.

The contributions featured here reveal a generation that is responding to change, actively shaping it: addressing sustainability, digital integration, and operational efficiency with confidence and clarity. These voices demonstrate an understanding that global shipping thrives on credibility, collaboration, and long-term thinking.

This book is more than a collection of insights; it is an affirmation of responsibility. My hope is that it inspires readers and contributors alike to see themselves as custodians of a shared maritime future defined by innovation, cooperation, and continuous excellence.

Aziz Mantrach
FONASBA Chairman of the YABA Review Committee

Members of the YABA Review Committee

The launch of the FONASBA Young Ship Agent and Broker Award (YABA) 2025 is a powerful celebration of the voice, vision, and immense potential of our youth as catalysts for leadership, innovation, and positive change within the global maritime industry. It affirms our belief that the future of ship agency and shipbroking lies firmly in the hands of well-prepared, inspired, and ethically grounded young professionals.

As Chairman of the Education and Quality Committee and a member of the Vetting Committee, I am especially proud of YABA as a strategic and forward-looking platform for identifying, nurturing, and empowering emerging talent who will shape the future of FONASBA. The YABA Book Award, in particular, continues to provide a meaningful pathway through structured mentorship, skills development, and healthy competition, reinforcing our commitment to attracting, engaging, and retaining young members who are eager to learn, contribute, and lead.

The YABA Awards have grown in prestige and appeal, rewarding excellence, originality, and commitment. Through this innovative initiative, FONASBA consistently demonstrates that when young people are given the right opportunities, guidance, and exposure, they rise with confidence, creativity, and purpose.

I encourage all eligible young professionals to begin preparing now and to actively participate in the YABA Competition 2026. The opportunities for recognition, growth, and mentorship are substantial, and the rewards extend far beyond the awards themselves.

I warmly congratulate the YABA 2025 award winners for their outstanding achievements. For the first time, they had an opportunity to attend the AGM and present their papers. Your success inspires others and stands as a testament to what is possible through dedication, mentorship, and vision. Together, we look to the future of ship agency and shipbroking with renewed hope and confidence.

Antonios Venieris
FONASBA Chairman Education and Quality Committee

The 12th cycle of the YABA project has demonstrated the truly international scope of FONASBA initiative. With 12 papers submitted by participants from 10 different countries across three continents, the project continues to affirm its global presence. This diversity highlights the wide reach of shipping agency business community while also reflecting the strong motivation among our younger colleagues to engage in research, analysis, and thoughtful reflection on both the current state and future direction of our profession.

The range of topics addressed in this cycle has been particularly impressive. The papers explored subjects such as the impact of artificial intelligence on the industry, strategies for reducing fuel consumption and minimizing greenhouse gas emissions, the digital transformation of shipping agency practices, challenges and opportunities for women working in the shipping industry, and the vital role of ship agents and brokers in advancing maritime sustainability. Together, these topics illustrate the breadth of interests among our young colleagues and confirm their awareness of the most significant global trends shaping the shipping industry today.

Through the research presented in these papers, we are able to deepen our collective understanding of key issues in the maritime field. The papers serve as valuable reference points, providing a solid foundation for further research and discussion. In this way, the YABA project fosters a culture of continuous learning and professional development within our industry.

I would like to highlight the words of Joseph Matti Altaweel, who succinctly captured the evolving responsibilities of maritime agents in the modern era:

"As the shipping industry continues to evolve, ship agents must adapt to new challenges and opportunities, leveraging digital technologies and embracing sustainability to stay competitive. By investing in digital skills, building stronger partnerships, and staying informed about new market trends, ship agents can enhance their own operations while contributing to the broader goal of creating a more efficient and sustainable shipping industry."

With the continued success and growing impact of the YABA project, I strongly encourage our young colleagues to apply for YABA 2026. I am confident that the publication of their papers will contribute both to the advancement of their individual careers and to the ongoing development and progress of our profession.

Jakov Karmelić
FONASBA former Vice President for Education

The Young Agents & Brokers Award (YABA) continues to showcase the best of our profession: curiosity, rigor, and a commitment to serving with excellence. This year's book brings together perspectives that do more than describe challenges—they offer practical ways forward. From strengthening compliance and operational quality to embracing digital tools and data-led decision-making, the contributions reflect the everyday craft of ship agency and broking and the future we are actively building.

As Deputy Secretary General and Director of Contracts, I see first hand how fresh thinking from early-career professionals improves the way we communicate, negotiate, and deliver value to our customers. YABA creates a platform where ideas are tested, confidence is built, and peer networks take root. That combination—ideas, confidence, and community—advances our whole sector.

To every contributor and reader: treat this book as a conversation starter. Share chapters with colleagues, discuss what resonates, pilot one insight in your team, and offer mentorship to the next generation. To the winners—congratulations—and to all participants, thank you for the energy you bring.

My gratitude to FONASBA and the editorial committee for stewarding this important initiative. May the YABA Book inspire us to lead with integrity, safety, and efficiency in the year ahead.

Stinne Taiger Ivø
BIMCO Deputy Secretary General & Director of Contracts

It was a privilege to serve on the YABA panel for this year's competition and to witness the creativity, insight, and ambition reflected in the essays provided by the entrants. This award is more than a recognition of individual achievement—it is a celebration of the ideas and energy that will shape the future of our industry. Each contribution demonstrates not only technical knowledge but also the passion and commitment that drives progress.

For young professionals, opportunities like this are invaluable. They provide a platform to share perspectives, challenge assumptions, and inspire others. The essays collected in this year's YABA 2025 Book are a testament to the depth of talent among those young agents and brokers and a reminder that innovation often begins with fresh thinking and bold questions.

As an industry, we thrive when we invest in the next generation. This competition does exactly that: it encourages dialogue, rewards excellence, and builds a sense of community. I am proud to play a part in recognizing these voices and supporting their journey. Congratulations to all who entered—you are helping to define what comes next, and that is something worth celebrating.

Mark Brattman
ITIC Claims Director

As the director of the International Maritime Union in Greece, I am truly honoured to be a member of FONASBA's Young Ship Agent & Ship Broker of the Year Award Review Committee, for I genuinely believe that -just like the introduction of the FONASBA Quality Standard – the YABA ranks among our Federation's most inspiring and promising initiatives, throughout the course of its history.

In my humble opinion, the YABA initiative serves not only as a unique platform for my Fellow -albeit much younger- Agents and Brokers to conduct their own original or secondary research and present their findings, conclusions and proposals to a global audience of Maritime Professionals, but it also constitutes a unique opportunity to get acquainted and familiarize themselves with FONASBA's international Community as well as the diversified modus operandi of its Members.

Shipping and its related professions at sea and ashore have always been subject to the ancient Greek Philosopher Heraclitus' principle «change is the only constant in life», and no matter how glorious our past may have been or how bright we aspire our future to be, it all comes down to our willingness to «learn, unlearn, and relearn» and this is precisely why YABA is much more than an essay competition; it is a stepping stone for junior Professionals to make their mark by offering fresh perspectives, for senior ones to take notice of, and -most importantly- for all of us to «adopt, adapt, improve».

Anacreon Mataragas, FICS
International Maritime Union in Greece Director

ANCHORING ACCOUNTABILITY: ENHANCING TRANSPARENCY IN MARITIME TRADE

JITHESH PRAKASH

UNITED ARAB EMIRATES

2025

ANCHORING ACCOUNTABILITY: ENHANCING TRANSPARENCY IN MARITIME TRADE

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UNITED ARAB EMIRATES

INTRODUCTION

OVERVIEW OF DARK FLEETS IN GLOBAL MARITIME TRADE

Global maritime trade stands as one of the most critical arteries of the modern economy, responsible for the movement of approximately 80–90% of all goods traded across the globe (UNCTAD), 2024). From oil and gas to electronics, clothing, and agricultural products, ships transport the vast majority of commodities that sustain daily life and international commerce. Yet, behind the seemingly well-regulated facade of container ports and shipping routes, a shadow network has emerged, one that exploits the loopholes of maritime law, geopolitical tensions, and lax oversight mechanisms to operate in the margins of legality. These are the so-called dark fleets: vessels that purposefully evade detection and accountability by operating under concealed ownership, falsified documentation, and deceptive routing techniques.

Dark fleets are not entirely new to the maritime industry, but their prevalence and sophistication have surged in the wake of rising global sanctions, increased geopolitical tensions, and a broader digital transformation of the shipping industry. The term “dark fleet” refers to a network of vessels, predominantly oil tankers and bulk carriers, operating outside the normal maritime transparency framework. They frequently disable their Automatic Identification Systems (AIS), engage in ship-to-ship (STS) transfers in poorly monitored waters, and falsify cargo documentation to hide the origin or destination of their goods. These strategies are not merely technical infractions, but they are deliberate acts of obfuscation, designed to evade international sanctions, environmental regulations, and financial compliance protocols.

At the heart of the dark fleet problem is the international community’s inconsistent maritime enforcement, which enables such vessels to function across national boundaries with relative impunity. These vessels are often registered under so-called “flags of convenience,” a legal mechanism that allows shipowners to register their vessels in countries with lenient maritime laws. (Julien Bouissou, 2024). Additionally, the true ownership of these ships is frequently hidden behind layers of opaque corporate structures, including shell companies headquartered in secrecy jurisdictions. As a result, holding shipowners accountable for environmental disasters, sanction breaches, or illegal cargo becomes nearly impossible. ((OECD), 2023)

Over the past decade, dark fleets have proven themselves to be resilient and adaptive actors in the maritime ecosystem. As regulators and tracking technologies evolve, so too do the evasion tactics employed by these vessels. While sanctions against countries like Iran, Venezuela, North Korea, and Russia have led to a surge in the use of dark fleets to transport restricted commodities such as crude oil, they have also exposed deep vulnerabilities in the international regulatory architecture (Council, 2023).

In 2022 alone, the dark fleet responsible for carrying Russian crude oil saw explosive growth in the aftermath of the Ukraine conflict and Western-imposed sanctions. As traditional shipping routes and clients became inaccessible due to embargoes and price caps, Russia, like Venezuela and Iran before it, turned to an alternative logistics infrastructure that enabled the continuation

of exports through sanction-evading tactics, particularly in collaboration with third-party countries.

Yet the consequences of these fleets are not limited to geopolitical subversion. They represent a clear and present danger to global financial institutions, environmental safety, and maritime security. Many of the ships involved are over 20 to 25+ years old, poorly maintained, and often lack valid Protection & Indemnity (P&I) insurance. ((IMO), Global Maritime Security: Threats and Challenges, 2022). This not only increases the likelihood of vessel failure and catastrophic spills but also leaves coastal nations and marine ecosystems vulnerable to irreparable harm, with no recourse for damages.

SIGNIFICANCE OF THE ISSUE

The growing influence of dark fleets marks a serious challenge to global governance across multiple domains. While the maritime industry traditionally operates under complex but structured systems governed by organisations like the International Maritime Organisation (IMO), the emergence of dark fleets undermines the legitimacy and efficacy of these institutions. The significance of dark fleet operations can be understood across four interconnected spheres:

a. Sanctions Enforcement: Dark fleets directly undermine the power of economic sanctions, which are a key tool used by nations to exert diplomatic pressure on rogue states, deter military aggression, and enforce international law. By providing a clandestine channel for transporting sanctioned goods, particularly oil from Russia, Iran, and Venezuela, these fleets render sanctions less effective and deprive sanctioning states of leverage.

According to multiple independent tracking firms and maritime intelligence providers, between 1.5 and 2 million barrels of crude oil per day are transported globally using dark fleet tankers (Soldatkin, 2024). This volume, if monetized at conservative estimates of $70 per barrel, represents over $100 billion annually in sanction-bypassing oil trade. The scale of this economic leakage poses a grave threat to international financial systems and the credibility of multilateral enforcement mechanisms. ((CREA), 2024)

b. Maritime Security and Sovereignty: Many dark fleet vessels operate in sensitive maritime corridors, such as the Strait of Hormuz, the South China Sea, and the Eastern Mediterranean, where overlapping territorial claims already make naval governance challenging. These unmonitored vessels can serve as platforms for smuggling, arms trafficking, and even terrorist logistics. Their presence compromises national security and hampers regional stability, especially in areas where maritime borders remain contested or poorly enforced. (IMO), Maritime Security and Piracy Reports 2023, 2024
c. Environmental Risks and Safety Hazards: The environmental impact of dark fleets is disproportionately high. Because these vessels often bypass safety inspections and are not covered by standard insurance policies, they pose a significant risk in terms of oil spills, onboard fires, and maritime accidents. In 2022, a vessel suspected of carrying

sanctioned Venezuelan oil ran aground near Gibraltar, spilling crude into the sea and costing over $100 million in cleanup and compensation. Such incidents are expected to rise as dark fleet vessels grow older, and maintenance remains neglected. (Pedrozo, 2025)

Moreover, these vessels often dispose of waste illegally, conduct ballast water discharges in ecologically sensitive zones, and bypass routine emission control area (ECA) restrictions, further exacerbating marine pollution and contributing to global climate change. (Tannenbaum, 2024)

d. Financial and Legal Risk to Stakeholders: For banks, insurance providers, and shipping brokers, dark fleet activities pose enormous reputational and legal risks. Financial institutions that unwittingly finance transactions involving dark fleet cargo can become subject to regulatory penalties, and insurance companies may face fraudulent claims involving vessels or cargoes that were misrepresented through forged Bills of Lading (BLs) or falsified vessel certifications.

Compliance teams at banks and maritime law firms report that they are overwhelmed by the growing sophistication of document forgery and frequently lack the tools or data to verify vessel histories in real time. The implications of this gap are far-reaching, especially in a world where global supply chains are increasingly scrutinised for compliance with Environmental, Social and Governance (ESG) standards. (Tannenbaum, 2024)

OBJECTIVES OF THE PAPER

The purpose of this paper is to provide a comprehensive, detailed exploration of the dark fleet phenomenon, identifying the full scope of the problem and presenting practical, enforceable strategies for its control. The key objectives are as follows:

a. To analyse how dark fleet vessels operate, including their use of AIS manipulation, forged documents, ship-to-ship transfers, and multi-port routing to obscure cargo origins and vessel movements.
b. To examine the structural vulnerabilities in the global maritime system that allow these fleets to thrive, particularly jurisdictional gaps, lack of enforcement coordination, and geopolitical ambiguity.
c. To evaluate the economic, environmental, and security threats posed by these clandestine operations, drawing on case studies, international data, and expert reports.
d. To propose robust detection and prevention strategies, leveraging technology, international cooperation, financial reform, and legal instruments that target the enablers of dark fleet activity.
e. To advocate for increased transparency, accountability, and sustainability in maritime governance through regulatory reforms, blockchain implementation, vessel tracking innovations, and harmonised sanctions enforcement.

By addressing these aims, the paper seeks to arm policymakers, regulators, financial institutions, and maritime professionals with the tools and understanding required to disrupt the shadow networks that threaten the integrity of global maritime trade.

UNDERSTANDING DARK FLEETS

CHARACTERISTICS AND KEY FEATURES

The term “dark fleet” refers not merely to vessels that seek anonymity but to an entire class of maritime operations designed to operate in the shadows, shielded by opacity, deception, and legal ambiguity. These ships, often engaged in illegal or quasi-legal activity, are defined not by a single trait but by a complex matrix of behaviours and features that make them hard to trace and even harder to hold accountable.

At the heart of dark fleet operations lies concealed ownership. Most of these vessels are registered under opaque corporate structures, frequently involving shell companies based in secrecy jurisdictions such as Panama, Liberia, St Kitts, Nevis and the Marshall Islands. This lack of transparency is not a side effect but rather a deliberate strategy that allows bad actors to avoid scrutiny, accountability and regulatory obligations. In many cases, tracing the true ownership of a dark fleet vessel requires not only cross-border legal cooperation but also forensic-level financial investigation. (Intelligence, 2023)

In tandem with opaque registration practices, dark fleet vessels often operate with forged or manipulated documentation. Bills of Lading (BLs), a core legal instrument in international shipping, are frequently altered to disguise the nature or origin of cargo. In dark fleet operations, it is not uncommon for oil originating in sanctioned countries such as Iran or Russia to be labelled as coming from third-party nations like Malaysia, Oman or the UAE. These falsifications allow the cargo to pass through customs and inspection points with reduced risk of detection, especially in jurisdictions with weak maritime enforcement. (Triebert, 2023)

Adding to this ecosystem of deception is the manipulation of Automatic Identification Systems (AIS), a technology mandated by the International Maritime Organisation (IMO) to track vessels in real time. Dark fleet operators often engage in AIS spoofing, transmitting false location data to disguise the ship's true coordinates or simply turn off their transponders altogether while passing through sensitive regions. Disabling AIS is a flagrant violation of international maritime law, yet it remains a common tactic due to the difficulty of enforcement in vast international waters. (Androjna A. P., 2024)

Another essential strategy is the use of Ship-to-Ship (STS) transfers, wherein cargo is moved between vessels while at sea, typically in neutral waters. These transfers are often conducted under the cover of darkness or in remote locations to avoid detection by satellite imagery or naval patrols. Through STS operations, dark fleet vessels can effectively launder the origin of their cargo. For example, sanctioned crude oil might be transferred from a flagged vessel to one with no direct connection to a sanctioned country, thus creating a paper trail that appears legitimate. (Ballinger, 2024)

KEY MOTIVATIONS BEHIND DARK FLEET OPERATIONS

Understanding the motivations behind dark fleet operations requires a closer look at global economic incentives, geopolitical tensions, and structural gaps in the maritime trade system. While specific objectives vary, several key drivers consistently underpin their activities, including:

a. Evasion of International Sanctions

One of the primary drivers of dark fleet activity is the desire to evade international sanctions, especially those targeting the export of oil and gas from countries like Iran, Russia, Venezuela, and North Korea. Sanctions imposed by major economies, including the United States, the European Union, and the United Kingdom, are designed to exert economic pressure on governments accused of human rights violations, nuclear proliferation, or aggression against sovereign states. However, enforcing such sanctions on the high seas is immensely difficult, and dark fleet operators exploit this challenge to maintain revenue streams from banned exports. (U.S. Department of State, 2020)

Following Russia's invasion of Ukraine in 2022, a robust sanctions regime targeted its energy exports. In response, Russia increasingly relied on a shadow fleet composed of older, minimally insured vessels registered under opaque ownership structures and flags of convenience. These tankers employed AIS spoofing and ship-to-ship (STS) transfers to deliver crude oil to nations less stringent in sanction enforcement, such as India and China (Androjna A. P., 2024) (Lloyd's List Intelligence, 2023).

b. Illicit Cargo Movements: Arms, Drugs, and More

Dark fleets are not limited to smuggling hydrocarbons. They also play a pivotal role in the global black market for arms, narcotics, counterfeit goods, and endangered wildlife. The same techniques that allow oil shipments to evade scrutiny, falsified paperwork, disguised routes, and STS transfers are equally effective for transporting high-value illegal goods.

In conflict zones, such as the Horn of Africa or Southeast Asia, dark fleet vessels have been linked to arms trafficking for militias and insurgent groups. Similarly, the UN Office on Drugs and Crime (UNODC) has identified maritime smuggling routes used to ferry drugs between Latin America and West Africa. These operations are facilitated by a lack of oversight in international waters, making interdiction both logistically difficult and politically sensitive. (United Nations Office on Drugs and Crime, UNODC, 2024)

c. Economic Incentives and Competitive Advantage

Beyond illicit trade, some dark fleet operators are motivated by economic rationality; they simply wish to minimize costs and maximize profits. Complying with international safety, environmental, and labour standards imposes significant operational burdens on legitimate shipping companies. In contrast, dark fleet vessels often forgo insurance, delay maintenance, and use low-wage, poorly trained crews, allowing them to undercut competitors on price.

Thus, the motivations behind dark fleet operations are varied but interlinked: the evasion of sanctions, facilitation of illicit trade, and pursuit of economic gain form the triad that sustains this shadowy parallel shipping industry.

GROWTH AND CURRENT SCALE

The proliferation of dark fleets over the past decade has been nothing short of staggering, reflecting both increased demand and systemic gaps in maritime governance. Once a fringe activity conducted by a handful of rogue states or criminal organizations, dark fleet operations have grown into a sophisticated global enterprise with hundreds of ships, billions in trade volume, and an expanding network of facilitators.

According to TankerTrackers.com, the number of vessels classified as dark or shadow tankers increased from roughly 200 in 2021 to over 600 by early 2024, a growth of 300 percent in just three years. This rapid growth has been driven primarily by demand from sanctioned oil

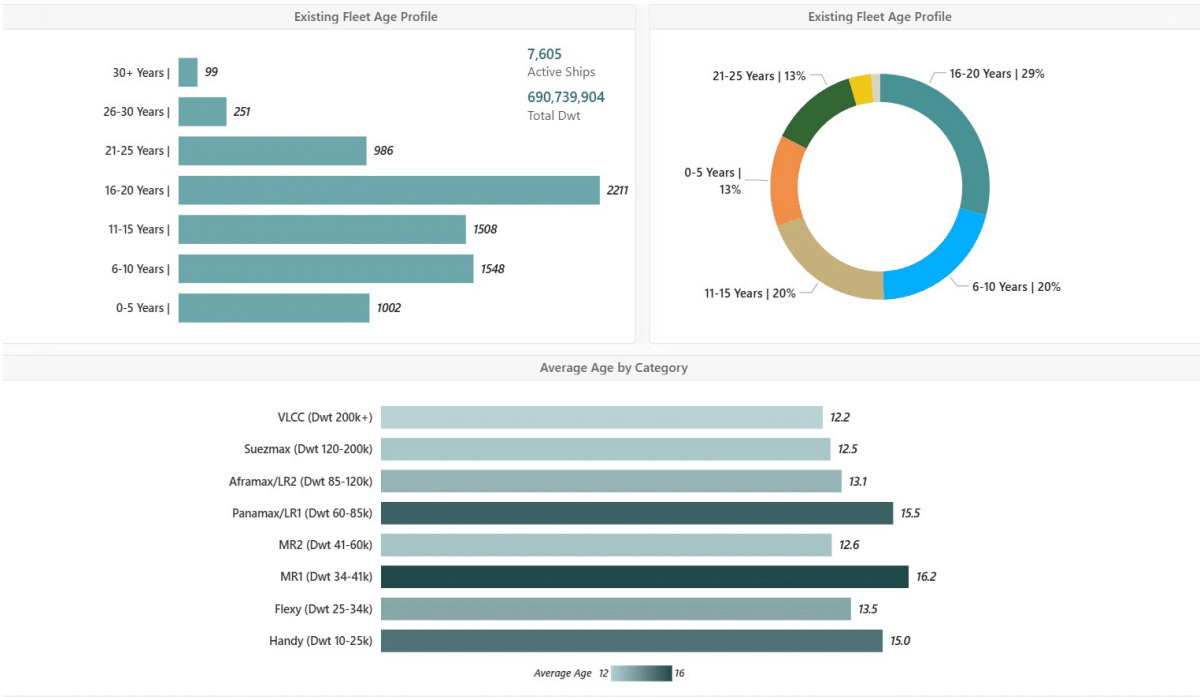

Figure 1 Global Fleet Age (Source Axis Data)

exporters seeking alternative supply routes. As Western countries tighten sanctions, sanctioned states and their allies have responded by acquiring or chartering older tankers to create what analysts have dubbed a “ghost fleet.”

These vessels often operate well beyond their expected service life, with many exceeding 25–30 years in age. This is supported by data from AXIS Marine, which shows that more than 1,300 vessels in the global fleet are over 25 years old, including nearly 100 ships above 30 years.

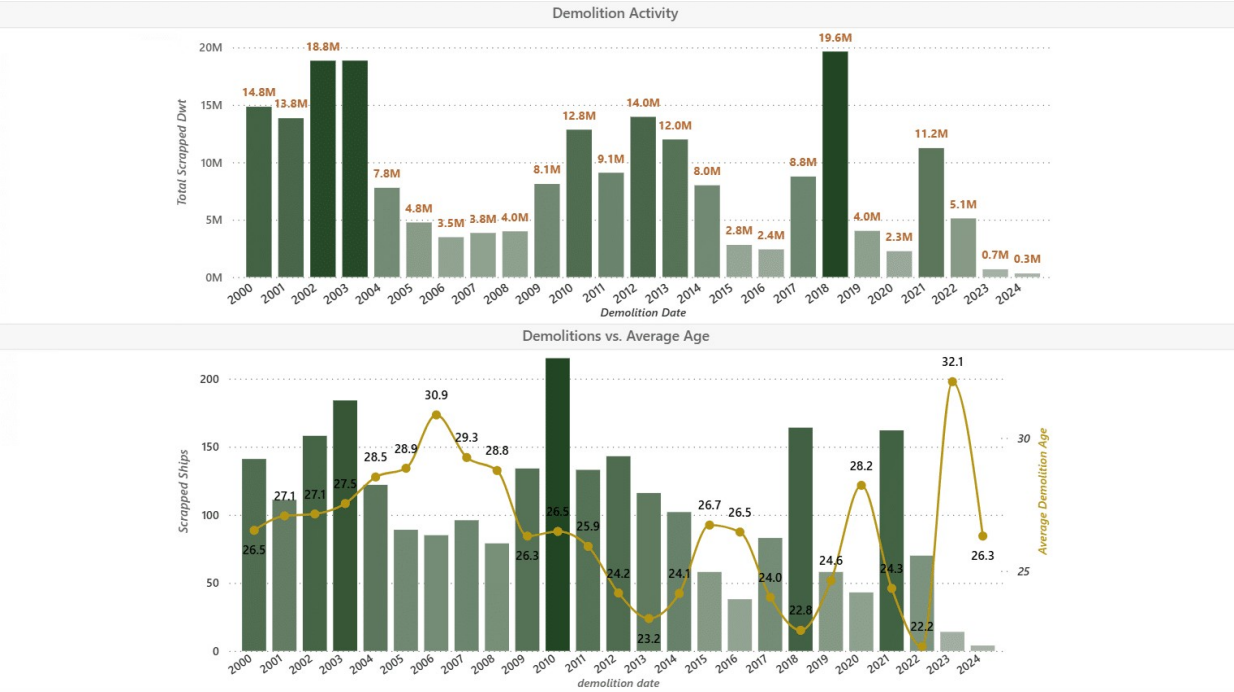

Figure 2 Demolition Activity (Source: Axis Data)

Older tankers are more readily available on the second-hand market, cheaper to acquire, and less likely to attract regulatory scrutiny when reflagged under obscure jurisdictions. Because these vessels often lack valid classification or Protection & Indemnity (P&I) insurance, they are considered unfit for regular commercial activity but remain perfectly suited for high-risk, high-reward ventures like sanction evasion.

In terms of impact, dark fleets now carry approximately 10% of global seaborne crude oil, according to data compiled by Bloomberg and maritime intelligence firms. This figure underscores not just the scale of the problem, but its normalization within global trade. When one in ten barrels of oil at sea is effectively “off the books,” the implications for energy, financial institutions, and environmental safety become profound.

Dark fleet operations are no longer limited to tankers. The model has been replicated across other sectors, including dry bulk carriers and container ships. Analysts estimate that 5–10% of containerized trade globally may involve some form of illicit activity, whether through falsified

manifests, smuggling of contraband, or evasion of customs duties. In regions like West Africa and Southeast Asia, entire port clusters have become hubs for these shadow trades. (List, 2023)

Finally, the influence of dark fleets extends beyond the vessels themselves. A web of logistics firms, maritime lawyers, port agents, and financial intermediaries plays a critical role in enabling these operations. Many of these actors operate in grey zones, offering “compliance advisory services” that, in practice, amount to regulatory arbitrage. The result is a global maritime shadow economy that is increasingly difficult to dismantle.

OPERATIONAL TACTICS OF DARK FLEETS

Understanding the operational behaviour of dark fleets is essential to unravelling their full impact on global maritime trade. These clandestine operations are not random acts of evasion or opportunistic shortcuts; rather, they are highly organized, well-financed, and deliberately orchestrated systems of deceit. They combine technical subterfuge, bureaucratic manipulation, and legal ambiguity to function outside the realm of legitimate maritime oversight. This section offers an in-depth exploration of the primary tactics that dark fleets employ to remain undetected, obscure the true origins of cargo, and evade international scrutiny. These methods include the falsification of documentation, manipulation of Automatic Identification Systems (AIS), utilization of multi-port call strategies, and Ship to Ship (STS) transfers, all designed to distort the vessel’s voyage history and mask the identity of owners and cargo.

MANIPULATION OF DOCUMENTATION

At the heart of dark fleet operations lies the manipulation and fabrication of critical shipping documents, particularly the Bill of Lading (BL). The BL is more than just a receipt for cargo; it is a legal document that serves as a title to the goods and a key reference for banks, insurers, customs authorities, and legal entities involved in maritime logistics. Its falsification has far-reaching consequences, enabling illicit cargo to enter legal supply chains and undermining global trade compliance mechanisms.

Operators within the dark fleet system are known to systematically switch BLs to misrepresent the origin, nature, or ownership of cargo. For example, crude oil loaded in a sanctioned country such as Iran or Venezuela may be rebranded on paper as originating from a neutral or third-party location like Oman or Malaysia. These altered documents are then used to deceive buyers, authorities, and financial intermediaries involved in the transaction. The alteration of BLs is often carried out in conjunction with false port records and tampered cargo manifests, effectively creating an entirely fictitious trade narrative.

The motivation for this deception is clear: a legitimate-looking BL allows the illicit cargo to pass through customs and gain entry into regulated markets. Furthermore, banks and insurers rely heavily on these documents when providing letters of credit or underwriting shipment risks. A

forged BL thus allows the dark fleet to secure financing and insurance under false pretences, further embedding illicit trade within the legitimate financial system.

FRAUDULENT VESSEL CERTIFICATION AND REGISTRY PRACTICES

Equally problematic is the widespread use of fraudulent or expired vessel certification. Every commercial ship is required to carry various safety and operational certificates issued by classification societies. These documents verify that the vessel meets international safety, maintenance, and operational standards. However, dark fleet operators often circumvent this system by either forging certificates or continuing to operate with expired or revoked documentation.

Many vessels operate under Flags of Convenience (FOCs), often in jurisdictions known for minimal regulatory oversight. These open registries often lack the capacity or will to enforce safety, labour, and environmental standards, allowing shipowners to obscure vessel histories and evade accountability. Through this form of regulatory arbitrage, non-compliant or sanctioned vessels can easily reflag with falsified documents and continue operating with impunity.

Adding to this challenge is the abuse of the IMO vessel numbering system, originally intended to ensure unique ship identification. Investigations show that bad actors exploit the system by transferring IMO numbers between ships or using forgeries to conceal a vessel's identity. This is frequently paired with FOC reflagging, making it difficult for authorities to trace vessel ownership and compliance records. (Bockmann, Abuse of IMO vessel-numbering scheme and falsely flagged ships continues, committee hears, 2023)

The combined manipulation of identity and flag status creates major loopholes in maritime governance. Without stronger international enforcement and advanced tracking systems, these practices will continue to threaten safety, environmental security, and transparency in global shipping.

The implications of fraudulent certification extend beyond regulatory evasion. Ships that are improperly maintained pose a significant threat to marine ecosystems and crew safety. These vessels are more prone to mechanical failure, collisions, and environmental disasters. Moreover, if an incident does occur, the absence of valid certification and insurance coverage means that affected parties, including coastal states and shipping partners, are left to absorb the financial and environmental fallout.

AUTOMATIC IDENTIFICATION SYSTEM (AIS) SPOOFING AND DISABLING

AIS technology, mandated under the International Maritime Organization's Safety of Life at Sea (SOLAS) convention, is designed to prevent maritime collisions and promote transparency in shipping operations. Vessels above a certain size are required to broadcast their location, course, speed, and other identifying data through AIS, which can then be tracked by other ships,

ports, and satellite systems. However, in the murky waters of dark fleet operations, AIS is routinely manipulated to obscure a vessel's true movements.

There are three primary ways dark fleets manipulate AIS data:

a. Disabling AIS Transponders: In high-risk or high-surveillance zones, such as near sanctioned nations or in chokepoints like the Strait of Hormuz, vessels may deliberately turn off their AIS transponders to become "invisible" to tracking systems. This practice is commonly known as "going dark." While SOLAS requires continuous AIS broadcasting, enforcement of this rule is uneven, and many infractions go unnoticed.
b. Spoofing Location Data: More technologically sophisticated operators may engage in AIS spoofing, which involves sending false location coordinates or mimicking the identity of another vessel. This allows a sanctioned ship to appear as though it is operating in a completely different part of the world, misleading authorities and satellite monitors.
c. Identity Masking Through Vessel Cloning: In rare but growing cases, dark fleets have been found using the identity of a legitimate vessel, complete with cloned AIS signals and ship names to confuse regulators. In such scenarios, two ships may appear in the same region with identical identifiers, rendering tracking systems ineffective.

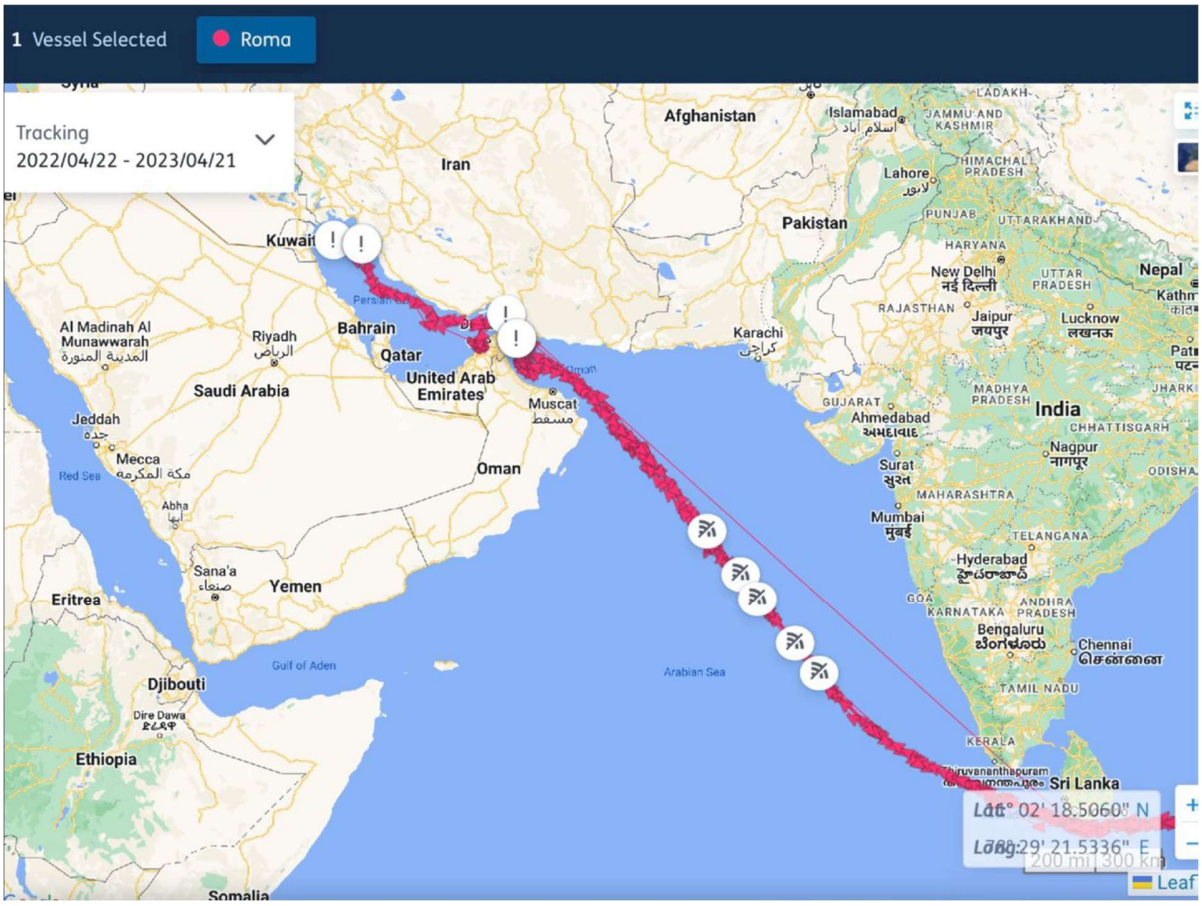

Figure 3 AIS Manipulation

The Roma, a 23-year-old VLCC, is suspected of deceptive operations, falsely claiming a Comoros flag and classification with Overseas Marine Certification Services, despite lacking valid registration, class, and insurance. The IMO database highlights these discrepancies, and a Panama-based classification society confirmed in April 2023 that it does not class the vessel. Registered under Koro Shipping Services Inc. in the Marshall Islands, Roma is listed in IMO GSIS, Lloyd's List Intelligence, and Equasis, but its Sharjah, UAE address is untraceable, and its ISM manager remains unknown.

AIS data reveals multiple transmission gaps, with the last recorded discharge at Dongjiakou, China, four months ago. While such vessels typically remain offshore to evade inspections, Roma was tracked at Manila anchorage from March 5–8, 2023, likely for a crew change. Lloyd's List contacted the Philippine authorities regarding a possible inspection but received no response. (Bockmann, Shifty Shades of Grey: the different risk profiles of the dark fleet explained, 2023)

These deceptive tactics render maritime surveillance tools less effective, making it extraordinarily difficult for enforcement agencies to monitor cargo routes or determine a ship's true point of origin. They also create significant safety risks for other vessels in crowded sea lanes, as untracked ships become collision hazards.

Multi-Port Call Strategies to Conceal Cargo Origins

Another intricate tactic employed by dark fleets is the use of multi-port call strategies. Instead of traveling directly from the loading port to the final destination, these vessels may stop at several intermediate ports, often in countries with minimal scrutiny where documentation is altered, cargo is partially offloaded and mixed, or simply to create confusion about the ship's voyage history.

For instance, a sanctioned crude oil cargo originating from Iran might be first shipped to a port in Pakistan, where part of the cargo is offloaded and rebranded. From there, the vessel may continue to any one of the oil-producing Gulf countries, where it undergoes another round of document adjustments before finally proceeding to its end-market in Southeast Asia or even Europe. By the time the cargo reaches its final port, its origin has been so thoroughly obscured that it appears indistinguishable from legitimate shipments.

These multi-port strategies serve several purposes. First, they disrupt the "chain of custody" in trade documentation, making it difficult for authorities or auditors to trace the cargo's original source. Second, they provide opportunities to launder the cargo's identity through STS transfers or the blending of different oil grades. Third, they allow for the manipulation of customs records and tax filings in ways that enable further financial fraud.

SHIP-TO-SHIP (STS) TRANSFERS IN INTERNATIONAL WATERS

Perhaps the most clandestine of all tactics is the Ship-to-Ship (STS) transfer. This practice involves the transfer of cargo between two vessels at sea, often in remote and loosely regulated international waters. While STS transfers are not inherently illegal and are frequently used for

logistical reasons in legitimate trade, they become problematic when used by dark fleets to launder the identity and origin of illicit cargo.

Figure 4 Indonesia seizes Iranian-flagged tanker suspected of illegal oil transfer

Indonesian authorities seized the Iranian-flagged super tanker MT Arman 114 in the North Natuna Sea for allegedly conducting an illegal ship-to-ship transfer of crude oil with the Cameroon-flagged MT Stinos. The vessel, carrying over 272,000 metric tons of light crude oil worth approximately $304 million, was found spoofing its AIS location to appear in the Red Sea while operating in Indonesian waters. Officials also accused the tanker of dumping oil into the ocean, violating environmental laws. The crew, including its Egyptian captain and 28 personnel, was detained, and authorities vowed stricter maritime patrols to prevent future violations. (Nangoy, 2023)

STS transfers allow dark fleet operators to mix sanctioned oil with legally sourced crude, creating a “gray market” product that is harder to trace. These exchanges often occur in known STS hotspots such as the Gulf of Oman, the South China Sea, the Eastern Mediterranean, and the mid-Atlantic. Because these areas are beyond the jurisdiction of any single nation, enforcement becomes a complex geopolitical challenge.

In addition to laundering cargo identity, STS transfers are often used to consolidate shipments from multiple small tankers into a larger vessel that is better equipped to deliver to major markets. This bulk consolidation further obscures the provenance of the cargo, especially when paired with falsified documentation and spoofed AIS signals.

Moreover, the absence of port infrastructure and emergency response teams in these remote areas increases the risk of oil spills and maritime accidents. Unlike regulated port facilities, open-sea STS transfers lack safeguards, oversight, and environmental contingency planning, making them a ticking ecological time bomb.

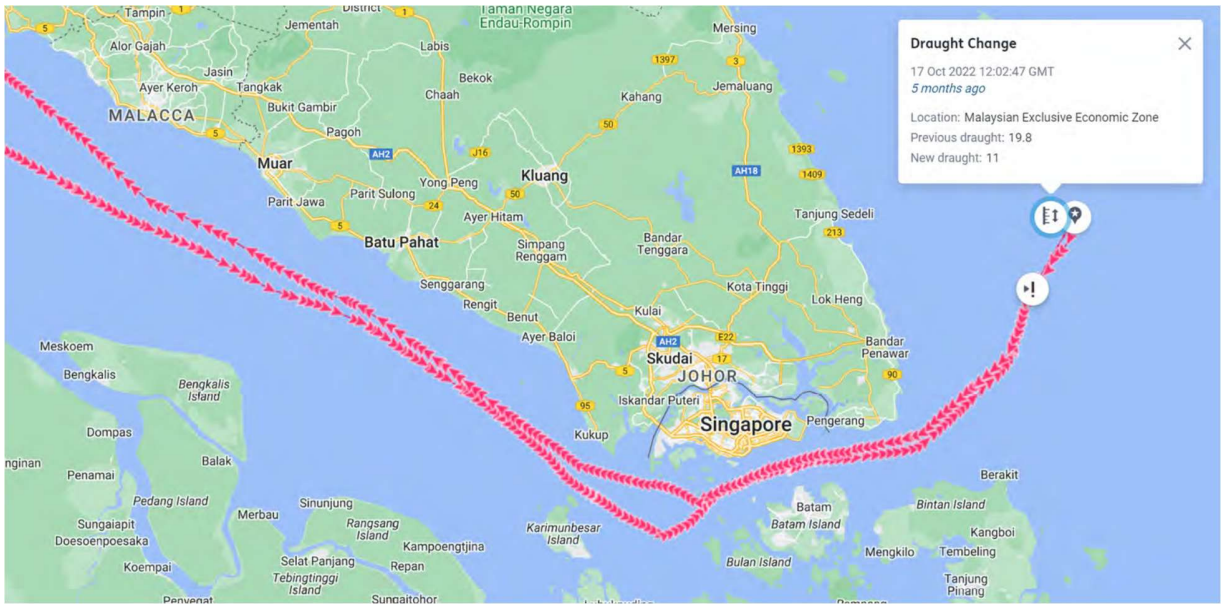

Figure 5: Route of crude tanker Hero II

The crude oil tanker Hero II travels from the Gulf of Oman, largely with its AIS turned off. It briefly appears during its transit through the Singapore Strait, then goes dark again. When it reappears, a draught change is logged before it heads back in the direction it came from. (Jungman, 2023)

THE IMPACT OF DARK FLEETS AND REGULATORY CHALLENGES

THE IMPACT OF DARK FLEETS

The activities of dark fleets that conceal their identity, ownership, and operations extend far beyond regulatory evasion. Their covert practices have far-reaching implications, destabilizing not only economic systems but also environmental safeguards, financial institutions, and national security frameworks. This section examines the multidimensional impacts of dark fleets across four critical domains.

ECONOMIC AND GEOPOLITICAL IMPLICATIONS

Dark fleets undermine the integrity of international sanctions regimes by covertly transporting restricted commodities, particularly oil and gas from sanctioned states such as Russia, Iran, Venezuela, and North Korea. These operations weaken the effectiveness of sanctions imposed by the United Nations (UN) or the European Union (EU) and other multilateral bodies and the United States of America (US), allowing targeted regimes to sustain revenue streams that fund military programs, domestic repression, or geopolitical provocations.

Beyond sanctions evasion, the unregulated inflow of such commodities distorts global markets. Illicit oil sales obscure true supply levels, complicating price forecasts and undermining legitimate exporters who must operate transparently. The resulting volatility affects not only energy markets but also national economies dependent on predictable pricing structures.

Geopolitically, nations are entangled in dark fleet logistics, whether through ship registries, port access, indirect trade risk, or diplomatic backlash. For instance, Southeast Asian states that engage with sanctioned oil may face tensions between economic needs and international obligations, straining their foreign policy positioning and exposing them to secondary sanctions or political pressure.

ENVIRONMENTAL AND SAFETY HAZARDS

Dark fleet vessels are frequently older ships with poor maintenance records, operating outside recognized safety and environmental frameworks. These conditions significantly elevate the risk of maritime accidents, particularly oil spills, which can devastate marine ecosystems and coastal communities. Such risks are amplified manifold because dark vessels often operate in remote or ecologically sensitive regions, including the Arctic and Southeast Asian waters.

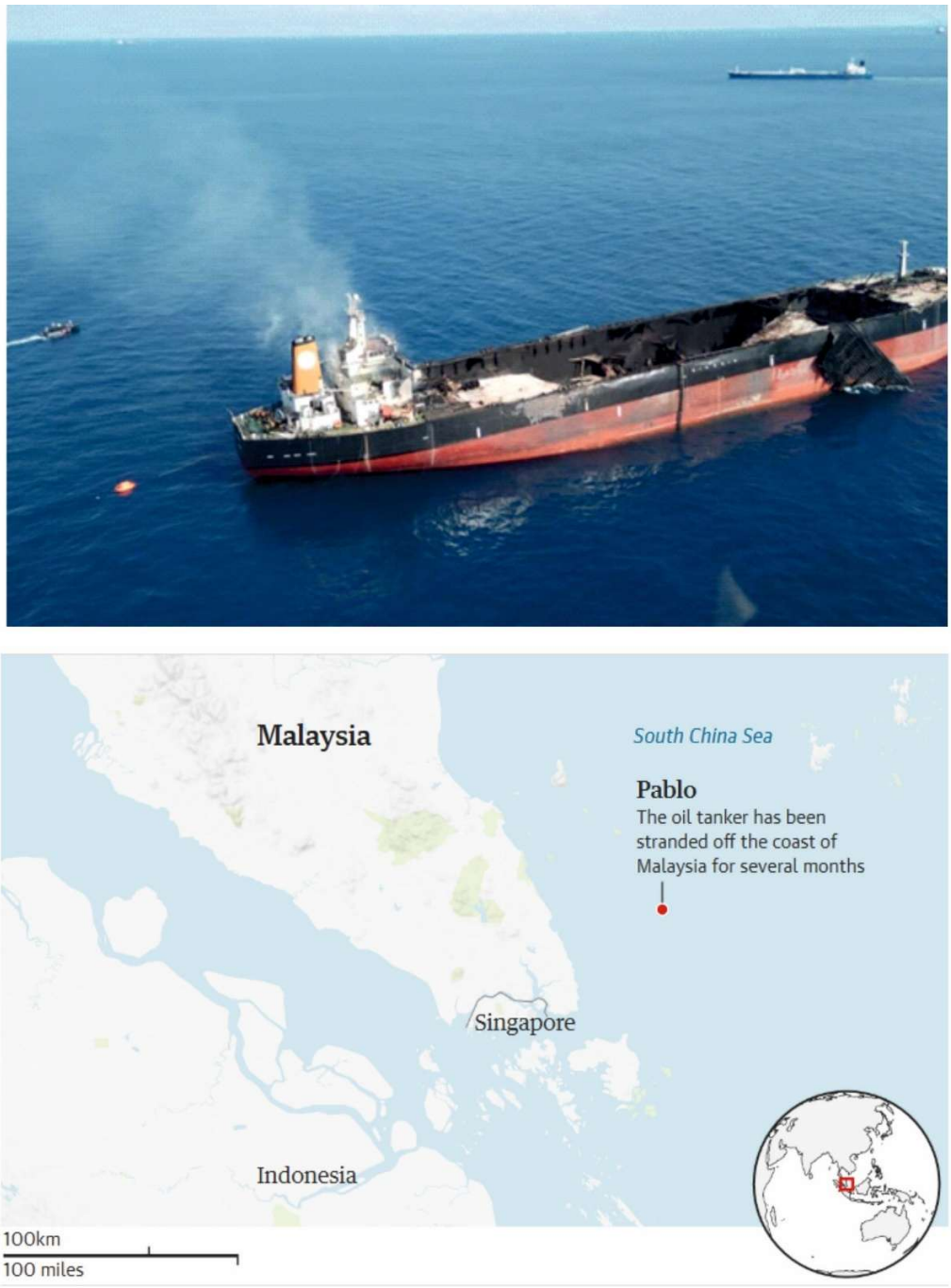

Figure 6: The Pablo Explosion

The explosion of the Gabon-registered oil tanker Pablo off Malaysia's coast highlights the dangers of shadow fleet operations, which involve aging, poorly maintained vessels transporting sanctioned oil under unclear ownership and without insurance. While 25 of 28 crew members were rescued, three remain missing, and cleanup efforts face obstacles due to the vessel's opaque registration. Reports indicate oil pollution near Indonesia, with no responsible party identified. The incident underscores growing concerns over fraudulent ship registrations, illicit oil trading, and maritime safety risks, calling for stronger global regulatory enforcement. (Mandra, 2023) (Krishnamoorthy, 2023)

Ship-to-ship (STS) transfers, a common method used by dark fleets to avoid detection, are often conducted without regulatory oversight. These transfers increase the likelihood of spills and complicate efforts to monitor vessel activity, especially when they occur in international waters.

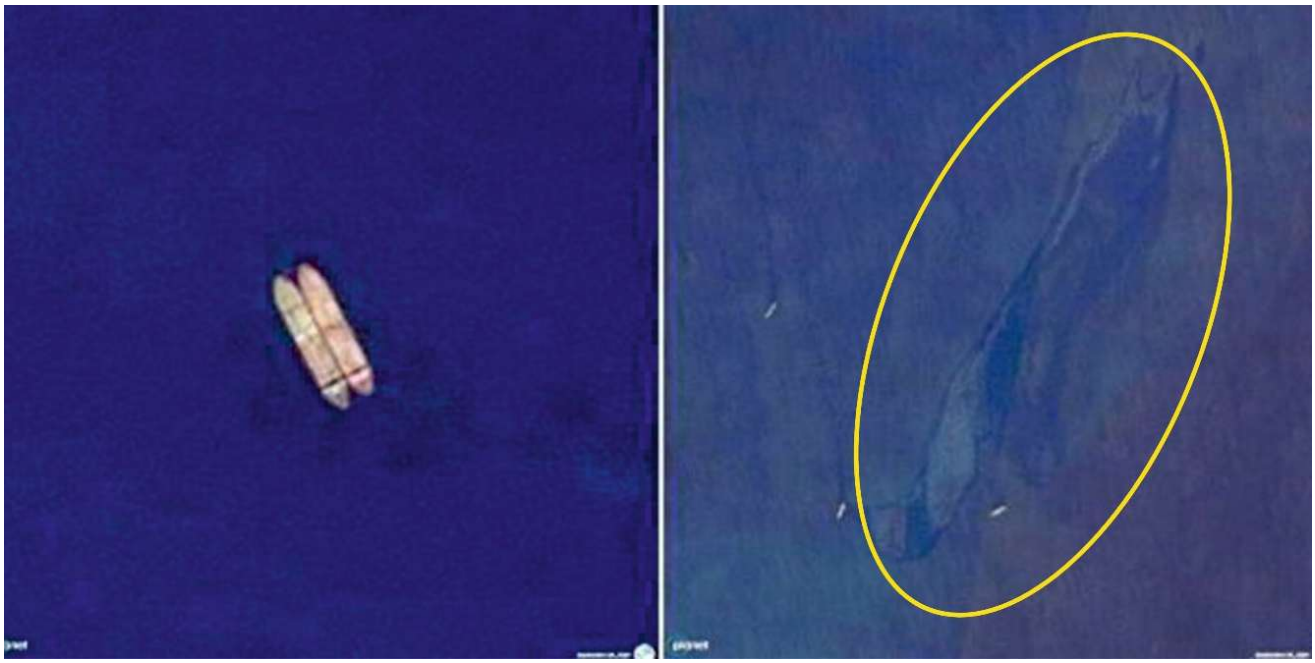

Figure 7 Dark fleet tankers 'spill 5,400 barrels

Two dark fleet tankers avoided nearby ports and conducted a ship-to-ship (STS) transfer at the intersection of Kuwait, Iraq, and Iran, an area known for unregulated maritime activities. The next morning, satellite imagery revealed an oil spill equivalent to approximately 5,400 barrels, yet no official reports were filed. These incidents occur frequently and unnoticed, leading to significant environmental damage and cleanup costs borne by coastal nations. The lack of oversight and accountability in such operations continues to pose a growing threat to marine ecosystems and regional stability. (Dixon, 2023)

Human safety is also compromised. Crews aboard these vessels frequently endure hazardous working conditions, in violation of the Maritime Labour Convention (MLC). Many lack adequate safety equipment, proper certification, or even legal employment status. In some cases, crew members are victims of forced labour or trafficking, an ongoing concern that merges human rights violations with maritime risk.

Figure 8 Smooth Sea 22 Explosion

The explosion of the Thai-flagged oil tanker Smooth Sea 22 on January 17th, which killed two crew members and left five missing, exposed a fraudulent ship-identity scheme. Though registered as a 2018-built vessel, investigations revealed it was actually built in 1986, previously sailing as Hai Zhou 168 and Smooth Sea 28. This deception links to North Korean sanctions evasion, a tactic observed in at least 11 vessels, according to C4ADS. The fraudulent IMO registration raises concerns over the validity of its $30 million insurance claim, highlighting broader risks in maritime security, compliance, and enforcement. (Smooth Sea 22 was not the ship it claimed to be, 2023)

FINANCIAL IMPACT AND ILLICIT FINANCING

The financial dimension of dark fleet operations is closely tied to transnational crime. Payments for illicit shipments often pass through complex webs of shell companies, offshore accounts, and opaque financial instruments. These practices facilitate large-scale money laundering, enabling criminal and state actors to integrate illicit funds into the legitimate financial system.

Such activities undermine global anti-money laundering (AML) efforts, erode trust in financial institutions, and enable sanctioned actors to maintain economic influence. Regulatory arbitrage and the use of legal grey zones make it difficult for enforcement agencies to trace the origin or destination of illicit funds.

The impact also extends to fair trade. By avoiding taxes, duties, and compliance costs, dark fleets can undercut legitimate operators, offering goods at artificially low prices. This not only distorts competition but also shifts the financial burden of cleanup, insurance, and enforcement onto compliant actors and public institutions, creating a structural disadvantage for law-abiding participants in global trade.

NATIONAL SECURITY RISK

Perhaps most alarmingly, dark fleets serve as conduits for the transport of arms, narcotics, and dual-use technologies that can be weaponized or diverted for illicit purposes. Their ability to evade detection makes them effective channels for supporting insurgent groups, militias, and even terrorist organizations. The resulting proliferation of weapons and controlled materials fuels conflict, undermines peacekeeping efforts, and destabilizes already fragile regions.

Because dark fleet operations often occur in legal and geographic grey zones such as international waters or ports with weak oversight, they represent persistent blind spots in maritime governance. This limits the ability of states to exert control over their borders and trade flows, posing long-term risks to national and regional security.

Figure 9 F Record Seizures of Drugs and Weapons in the Arabian Sea and Gulf of Oman

In 2021, U.S. and international forces under CMF, U.S. Naval Forces Central Command, and U.S. 5th Fleet seized over $193 million in illegal drugs and 8,700 illicit weapons during maritime interdictions in the Gulf of Oman and Arabian Sea. Increased patrols led to 50+ vessel boardings, 14 drug seizures, and multiple large-scale arms interceptions, including AK-47s, anti-tank missiles, and sniper rifles. The multinational coalition continues efforts to combat smuggling, disrupt criminal networks, and enhance regional maritime security. (Executive, 2022)

REGULATORY AND ENFORCEMENT CHALLENGES

One of the core challenges in regulating dark fleets is their strategic use of legal loopholes and technical subversion. Many vessels operate under flags of convenience or other flags where maritime oversight is weak, and compliance requirements are minimal. This allows ship owners to bypass national laws, lower costs, and obscure responsibility. Further complicating enforcement is the widespread use of shell companies and front organizations, often based in secrecy jurisdictions. These structures mask the true ownership of vessels, making it exceedingly difficult for authorities to trace operators or impose sanctions.

In addition to legal evasions, dark fleet vessels routinely manipulate or disable their Automatic Identification System (AIS), a key tool used by authorities to track maritime traffic. By broadcasting false coordinates (spoofing) or switching off AIS entirely, they can mask their movements and operate undetected in remote or loosely governed waters. These combined tactics, legal obfuscation, and technological evasion create a high degree of operational anonymity, severely hampering international efforts to monitor and control illicit maritime activity.

GAPS IN INTERNATIONAL COOPERATION AND COORDINATION

Another major challenge in combating dark fleets is the lack of cohesive international cooperation. The global nature of the shipping industry requires coordination among countries, international organizations, and regulatory bodies to enforce maritime laws effectively. However, fragmented legal frameworks, conflicting national interests, and the absence of a centralized enforcement mechanism create enforcement gaps that illicit operators exploit. While UNCLOS establishes fundamental maritime principles, it lacks strong enforcement tools, leaving shadow fleets largely unchecked. Some governments, driven by political concerns or economic incentives, hesitate to act, further weakening regulatory efforts.

Despite oversight from organizations like IMO, enforcement remains inconsistent due to sovereignty disputes and competing national priorities. Some states benefit indirectly from dark fleets, particularly through access to discounted commodities, reducing their motivation to intervene. Additionally, developing nations often lack the resources and technological infrastructure necessary for effective maritime monitoring, enabling illicit operations to thrive. In regions such as Southeast Asia, limited surveillance and enforcement capabilities allow shadow fleets to operate with minimal risk, highlighting the need for stronger international collaboration and regulatory measures.

FIVE STRATEGIES TO DETECT AND PREVENT DARK FLEET OPERATIONS

As dark fleet operations continue to grow in scale and complexity, global stakeholders must develop robust strategies to counter these illicit maritime networks. While enforcement efforts are often hindered by weak regulatory frameworks and jurisdictional loopholes, technological advancements and international cooperation provide promising solutions. This section outlines the key strategies that can be employed to detect and prevent dark fleet operations, ranging from enhanced vessel tracking systems to financial reforms and the implementation of artificial intelligence, blockchain technology.

STRENGTHENING VESSEL TRACKING AND INSPECTION MECHANISMS

a. AI-Powered Surveillance and Satellite Monitoring: One of the most promising developments in countering dark fleets is the application of artificial intelligence (AI) in vessel tracking. AI-powered surveillance systems can process vast amounts of data in real time, identifying irregular patterns in shipping activity and flagging suspicious behaviour for further investigation. While AIS data is frequently manipulated by dark fleet operators through methods such as spoofing and disabling the transponder, AI can analyse these irregularities and flag ships that exhibit abnormal behaviour. By leveraging machine learning algorithms, these systems can continuously refine their ability to detect vessels involved in illicit activities.

Satellite technology plays a crucial role in identifying dark fleet vessels that use AIS manipulation or engage in Ship-to-Ship (STS) transfers in unmonitored waters. In 2022, satellite imagery was used to track a network of shadow tankers moving sanctioned oil from Venezuela to Asia. By comparing satellite images with AIS data, authorities could identify discrepancies that indicated possible dark fleet activity. This combination of AI and satellite imagery allowed for the detection of illicit shipments that would have otherwise remained undetected.

b. Physical Inspections and Port Security

While technological advancements are essential, physical inspections at key ports and maritime hubs also remain a crucial part of the enforcement strategy. Enhanced port security measures, such as mandatory inspections of a ship's cargo and documentation, are vital in preventing dark fleet vessels from entering legitimate trade networks.

Countries that are major shipping hubs should implement stricter requirements for vessel certification, documentation, and crew qualifications. For instance, when a vessel enters a port, its Bills of Lading (BLs), cargo manifest, and vessel certificates should undergo thorough checks to verify the authenticity of the information. By ensuring that proper due diligence is conducted before allowing vessels to dock, ports can help block the entry of illicit goods and vessels associated with dark fleet operations.

Port State Control (PSC) authorities are responsible for conducting inspections to ensure that foreign ships comply with international safety standards. In 2021, the European Maritime Safety Agency (EMSA) led several high-profile port inspections aimed at detecting vessels operating under deceptive practices, such as falsifying BLs or using unregistered flags. By working in cooperation with international maritime organizations like the International Maritime Organization (IMO) and the International Maritime Bureau (IMB), port authorities can prevent illicit vessels from entering ports and conducting illegal transactions. (Agency, 2021)

FINANCIAL AND COMPLIANCE REFORMS

a. Enhanced Due Diligence by Financial Institutions

Banks, insurers, and other financial institutions serve as critical gatekeepers in preventing dark fleet operations, ensuring financial transactions linked to illicit trade are swiftly flagged and blocked. Know Your Customer (KYC) protocols are essential in identifying the true owners and operators of vessels engaged in suspicious activities. These measures require financial institutions to collect comprehensive data on vessel owners, operators, and cargo traders, ensuring that transactions tied to sanctioned entities are intercepted before completion.

However, the effectiveness of this system is hindered by vetting software limitations, creating unintended challenges. Current compliance tools, while designed to detect risks, often operate on outdated data, leading to legitimate vessels engaged in OFAC-approved trade being wrongly flagged and rejected. This lack of real-time precision forces financial institutions to err on the side of caution, impeding lawful transactions and frustrating businesses that are compliant with regulations.

To address this critical flaw, financial institutions must transition toward adaptive vetting solutions that incorporate real-time updates, dynamic risk modelling, and AI-enhanced transaction tracking. By leveraging advanced analytics, compliance teams can differentiate sanctioned activity from permitted operations, ensuring legitimate transactions proceed without unnecessary intervention. This shift will strengthen oversight without stifling lawful trade, ultimately enhancing efficiency while curbing illicit maritime networks.

Iran's ability to circumvent sanctions relies heavily on the use of shadow companies, shell corporations, and offshore accounts. In 2020, several financial institutions were implicated in facilitating illicit transactions related to Iranian crude oil. By failing to rigorously apply KYC measures, these institutions allowed dark fleet operators to move vast quantities of sanctioned oil through the financial system. Stricter compliance measures would have helped identify and block these transactions earlier, preventing the flow of illicit oil to foreign markets.

Some banks now rationally check the authenticity of the Bills of Lading submitted to them as part of a documentary credit. This has acted as a deterrent for dark fleet operators.

b. Anti-Money Laundering (AML) Measures and Transparency

In addition to KYC measures, Anti-Money Laundering (AML) regulations must be strengthened to prevent the illicit flow of funds that support dark fleet operations. Using complex money laundering schemes to finance the system of activities, practiced by the dark fleet operators, to hide the true ownership and origins of transactions.

To address this, the international community should push for greater financial transparency. Governments should impose stricter reporting requirements on companies involved in maritime trade, ensuring that financial institutions can track the origins of all transactions. Digital financial tools, including blockchain, can help enhance transparency and traceability by providing an immutable record of all transactions associated with dark fleet activities.

BLOCKCHAIN FOR TRANSPARENT SHIP OWNERSHIP AND CARGO TRACKING

a. Blockchain Technology: A Game Changer for Maritime Trade

Blockchain technology, often associated with cryptocurrency, holds enormous potential for transforming the way global maritime trade is monitored and regulated. By implementing blockchain-based systems, stakeholders can ensure greater transparency in ship ownership, cargo tracking, and the verification of Bills of Lading.

Blockchain's decentralized ledger system allows for the creation of a tamper-proof record of all transactions, providing a transparent history of a vessel's ownership and its cargo. This technology could help solve one of the most significant challenges in combating dark fleet operations: the lack of transparency in ship ownership.

In 2021, Singapore and Dubai began piloting blockchain-based systems to improve transparency in the shipping industry. The blockchain system used in Singapore's Port Authority, for instance, allowed stakeholders to track cargo shipments and verify vessel ownership in real time. This technology could play a pivotal role in detecting dark fleets, ensuring that ships engaged in illicit activities can be flagged and monitored at every stage of the transaction. (Singapore, 2021)

INTERNATIONAL COLLABORATION AND POLICY REFORM

A key challenge in combating dark fleets is the lack of consistent enforcement across countries. As different nations have different sanctions regimes, dark fleet operators can often find loopholes in certain jurisdictions. For example, while the European Union may enforce strict sanctions on Iranian oil exports, some major oil-consuming countries continue to purchase Iranian oil through intermediaries and shadow fleets.

To address this issue, international cooperation is essential. Organizations like the United Nations, the International Maritime Bureau (IMB), and the International Maritime Organization (IMO) must play a leading role in harmonizing sanctions enforcement across jurisdictions. By creating a global database of flagged vessels, authorities can ensure that all countries are on the same page when it comes to enforcing maritime sanctions.

CONCLUSION AND CALL TO ACTION

CONCLUSION

The rise of dark fleets poses a significant threat to the integrity of global maritime trade. Operating under concealed ownership, falsified documentation, and employing tactics such as AIS spoofing and ship-to-ship (STS) transfers, these vessels undermine international sanctions, maritime security, and environmental protection efforts. Despite growing awareness, enforcement remains fragmented due to jurisdictional loopholes, geopolitical complexities, and the exploitation of flags of convenience. Additionally, the manipulation of critical documentation like Bills of Lading (BLs) complicates detection and heightens the risk of financial fraud, exposing institutions, insurers, and regulators to reputational and legal consequences. However, advancements in vessel tracking technologies, the application of blockchain for cargo and ownership transparency, and stronger international coordination offer promising strategies to combat this threat.

To address the dark fleet phenomenon effectively, a unified regulatory response is essential. Governments and international bodies must collaborate to harmonize sanctions enforcement, enhance documentation transparency, and impose stringent penalties on those complicit in dark fleet operations. Financial institutions, insurers, and shipping brokers also have a critical role, with enhanced Know-Your-Customer (KYC) practices needed to disrupt illicit financial flows. Holding these stakeholders accountable ensures better screening of transactions linked to suspicious maritime activities. Investment in AI-powered surveillance, satellite monitoring, and real-time data analytics will strengthen global capacity to identify and respond to dark fleet operations, ultimately reinforcing the resilience of maritime trade against illicit actors.

FINAL CALL TO ACTION

The international community must take swift, decisive action to address the growing threat posed by dark fleets. This includes:

i. Strengthening sanctions enforcement through coordinated global efforts.
ii. Utilizing advanced technologies to track, monitor, and analyse vessel movements, ensuring that dark fleet vessels are detected before they can evade regulations.
iii. Enhancing regulatory oversight, with a focus on transparency and accountability in both shipping and financial sectors.
iv. Encouraging multinational cooperation to close regulatory gaps and create a unified framework for addressing dark fleet operations.

Governments, international regulatory bodies, financial institutions, and the maritime industry must all recognize that dark fleets undermine the integrity of global trade and pose significant risks to national and international security. The fight against these illicit networks will require collective action, transparency, and commitment from all stakeholders.

By adopting these strategies and ensuring that enforcement remains robust and coordinated, we can reduce the impact of dark fleet operations and safeguard the future of global maritime trade. The time for action is now, before dark fleets continue to grow in scale and influence, threatening the stability of the global economy, international security, and environmental sustainability.

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SUSTAINABILITY IN SHIP AGENCY SERVICES: AN INCENTIVE FOR A GREENER MARITIME FUTURE

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2025

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INTRODUCTION

BACKGROUND

The maritime sector is undergoing changes due to climate change and the increasing pressure to maintain a healthy environment. International and regional policies, especially those by the International Maritime Organisation (IMO) and the European Union, are heightening efforts towards emission reduction and decarbonization. In this regard, ship agents and brokers, who are customarily regarded as mere intermediaries concerning port activities, are increasingly becoming active facilitators of sustainability in shipping on all levels. Their roles now encompass much more than the coordinative and clerical functions associated with operational logistics to include active participation in emissions reduction, alternative fuel changeover, and the implementation of environmental regulations, making them central to the industry's ingredients towards sustainability.

PROBLEM STATEMENT

The role of ship agents is, however, underestimated in the target decarbonization value chain. While there is growing recognition of sustainability in shipping, ship agents' roles seem to be missing in the discourse. It is most likely that the attention is concentrated on shipowners and operators, which leads to the neglecting of the instrumental role that agents and brokers play towards compliance with the changing environmental regulations. This gap raises a pressing question: how can ship agents and brokers not only adapt to regulatory demands but also transform sustainability into a competitive advantage?

RESEARCH OBJECTIVES

This paper examines the shifting role of ship agents and brokers in advancing sustainability across the maritime sector. Its objectives are to:

- Investigate the regulatory frameworks shaping the industry's environmental agenda, with particular focus on the IMO's GHG Strategy, the EU Emissions Trading System (EU ETS), and the Carbon Intensity Indicator (CII).
- Identify the operational areas where ship agents actively contribute to emissions reduction and enhanced efficiency.
- Outline the commercial and strategic value of embracing sustainable practices, including improved access to green financing and strengthened client relationships.

- Present case-based insights from professional experience in the Adriatic and Mediterranean regions, illustrating the agent's contribution to more sustainable shipping operations.

SIGNIFICANCE OF THE STUDY

Drawing on regulatory frameworks, market dynamics, and operational experience, this paper examines the evolving role of ship agents in advancing maritime sustainability. It questions the traditional perception of agents as purely logistical intermediaries and brings attention to their shifting role in supporting environmental compliance and performance. In addressing a gap in the current literature, the paper also offers practical insights for agents and brokers seeking to respond to decarbonization demands while enhancing their strategic relevance in the industry.

STRUCTURE OF THE PAPER

The paper is structured into five main sections. Following this introduction, Section 2 examines the regulatory and market drivers behind sustainability in ship agency services. Section 3 investigates the operational contributions of agents, focusing on port call optimisation, alternative fuels, and green certification. Section 4 analyses the business case for sustainability, exploring cost savings, enhanced client trust, and long-term resilience. Finally, Section 5 presents the conclusion, summarising key findings and proposing recommendations for the future of sustainable ship agency practices.

THE GROWING IMPORTANCE OF SUSTAINABILITY IN SHIP AGENCY SERVICES

As the maritime industry undergoes a fundamental transformation in response to climate change and evolving environmental expectations, ship agents and brokers are progressively stepping into a central role in promoting sustainable practices. Beyond their role as logistical intermediaries, ship agents and brokers are starting to be seen as more of strategic partners than before, helping vessel operators not only adhere to environmental regulations but also pinpoint cost-effective and financially beneficial routes towards decarbonization. This section examines both the legal obligations shaping sustainable practices and the growing market demand for eco-friendly practices, establishing a clear foundation for why sustainability is now a core part of ship agency services.

REGULATORY IMPORTANCE OF SUSTAINABILITY IN SHIP AGENCY SERVICES

The legal framework in maritime shipping is not just scaling up - it is accelerating, and for those of us working in agency roles, this has changed how we approach nearly every port call. From my experience handling vessels in North Adriatic ports, compliance is no longer just a procedural step; it is a multifaceted operation requiring strategic pre-emptive collaboration, technical understanding, and insight. The speed of implementation, especially with EU and IMO regulations, means agents need to be ahead of the curve.

The International Maritime Organisation (IMO), through its 2023 GHG Strategy, has set ambitious targets such as cutting carbon emissions by 40% by 2030 and reaching carbon-neutral emissions by 2050[1]. These targets are supported by measures like the Energy Efficiency Existing Ship Index (EEXI) and the Ship Energy Efficiency Management Plan (SEEMP)[2]. In one recent case, I worked with a bulk carrier calling Rijeka, and delays in securing SEEMP documentation threatened the vessel's adherence. As an agent, I had to foster and expedite communication between the shipowner, port state control, and the local authorities to ensure timely clearance.
These are no longer exceptions - they're becoming the standard.

On the part of Europe, the extension of the Emissions Trading System (EU ETS) to include maritime from 2024 has elevated the discussion further. During my recent call from a short-sea vessel operating within the EU, discussions with the master and operators were centred around carbon emissions data, route optimisation, and cost forecasts tied to CO_2 allowances[3]. Agents are now supporting emissions monitoring and coordinating with charterers who are increasingly integrating emissions costs into their decisions. This increasing complexity makes our role not just logistical but calculated.

Similarly, the Carbon Intensity Indicator (CII) adds a real-time performance component to legal compliance. I've seen shipowners adjusting speeds specifically to avoid dropping into a D or E level. Agents are the bond in these scenarios, interacting between the shipping company, terminal, and port authority to align operations with the vessel's emission performance. In a recent case, we coordinated a JIT arrival that saved over six hours of waiting time, reducing emissions and improving the vessel's CII grade[4].

All of these examples showcase how legal compliance now depends on adaptable, informed, and reactive ship agency. We are not just fulfilling instructions but analysing policy on the fly, balancing compromises, and ensuring vessels remain competitive and compliant in an environmentally conscious market.

MARKET DEMANDS AND COMPETITIVE ADVANTAGES OF SUSTAINABILITY

While legal frameworks provide the directive, market dynamics now supply the progress. Based on my experience brokering cargoes between North Africa and Southern Europe, I've monitored firsthand how client preferences are evolving to accommodate new maritime challenges. Charterers are no longer focused exclusively on freight rates and availability – they progressively ask more and more about a vessel's emissions profile, fuel type, and even, although in rare instances, its green certifications. In accordance with a 2023 survey by the Global Maritime Forum, over 70% of cargo owners said environmental impact influenced their selection of shipping partners[5]. This isn't just an ecological consciousness matter - it's influencing who gets the business.

The role of the agent in this ever-developing business environment is also evolving. We're being asked to support not only operations but also to contribute to the client's sustainability depiction. This includes offering guidance on which ports offer sustainability incentives - such as discounts for low-emission vessels or energy-efficient shore power connections and accurately advising on the timing and method of bunkering to ensure compliance with low-carbon fuel legislations.
Furthermore, the transition to digitalisation is giving us increasingly more powerful tools to support this demand. The ability to handle documentation electronically, use AI for scheduling vessels, and support data-sharing in real time is no longer optional. These tools have helped us cut processing times and reduce fuel consumption, particularly during calls during increased port congestion. The World Bank has stressed that port digitalisation is one of the fastest and most cost-effective ways to reduce emissions while increasing efficiency[6].

Banks and cargo owners are observing these trends closely. Ships and agents that can demonstrate a devotion to sustainability-based business primarily backed by certification, documentation, and data are better positioned to access green financing or be nominated for high-value cargoes. As agents, our role in guiding clients towards qualifying for DNV or BIMCO green certification, and indirectly their access to sustainability-linked loans, has become more apparent.

In summary, market expectations are supporting the strategic value of environmental responsibility in the shipping agency. Clients are demanding it, ports are rewarding it, and banks are investing in it. For those of us on the front lines, adopting this change is no longer optional, yet crucial to staying relevant and competitive in a changing industry.

KEY AREAS OF SHIP AGENCY'S CONTRIBUTION TO GREEN SHIPPING

The perceptible impact of ship agents and brokers in furthering sustainable practices is most apparent through their contributions to specific operational areas. By integrating digital tools, promoting fuel transitions, and ensuring compliance with sustainability standards, they are transforming how maritime operations meet environmental expectations.

GREEN PORT CALL OPTIMIZATION

Green port call optimisation is a core area where ship agents streamline vessel operations to reduce emissions and improve efficiency. Just-In-Time (JIT) arrivals enable ships to slow steam toward ports, reducing fuel consumption and carbon emissions. By coordinating JIT operations and ensuring timely clearance procedures, agents help minimise idle times and congestion[7].

Complementing this is the ever more popular shift to digitalised documentation, which not only enhances speed and accuracy but also decreases the environmental burden of processes based on paper usage. According to a report by the International Association of Ports and Harbours, digitalised documentation can reduce port turnaround times by up to 40%, directly benefiting both efficiency and environmental impact[8].

In practice, I've seen how JIT arrangements save significant fuel and time. In a recent case, I worked with a container vessel in the Port of Rijeka to align arrival schedules with port availability. This coordination reduced anchorage waiting time by six hours, avoiding unnecessary fuel consumption and emissions. Additionally, by using electronic documentation, the vessel's clearance was processed more almost immediately, which also helped in reducing delays. This demonstrates how ship agents can effectively incorporate JIT planning and digital tools to optimise port operations if they have the necessary support from the terminal. Building JIT and digitalisation, AI-based scheduling tools offer predictive analytics that help shipping companies and agents make more efficient decisions[9]. These tools allow for more accurate berth windows and better synchronisation between vessel movements and port services.

FACILITATING LOW-CARBON AND ALTERNATIVE FUELS AND GREEN SHIP CERTIFICATION AND COMPLIANCE

The maritime industry's transition to alternative fuels such as LNG, methanol, and hydrogen is complex and requires coordination across multiple stakeholders. Ship agents play a vital role in managing these logistical challenges.

Arranging green bunkering operations is no longer just about scheduling; it involves securing permits, coordinating with fuel suppliers, and ensuring safety compliance[10]. Handling alternative fuels also means navigating evolving regulations and port-specific requirements. Ship agents now provide consulting services to shipowners, ensuring they comply with new safety and environmental standards[11]. Based on my knowledge and current experience, clear

communication with both the vessel and local authorities has been essential in managing alternative fuel operations smoothly and safely.

In addition to supporting fuel transitions and port call efficiency, ship agents play a crucial role in helping vessels meet environmental certification requirements. Their involvement ensures that shipowners remain competitive and compliant with global standards and frameworks.
With frameworks like the IMO's CII and EU ETS shaping operational practices, agents must interpret complex emission standards and help vessels meet regulatory benchmarks[12]. I've been partially involved in helping gather emissions data and submit compliance documents, all of which are critical for maintaining competitive performance ratings.

The DNV and BIMCO Green Ship Certification programs serve as benchmarks for sustainability performance. Ship agents streamline the entire process - from compiling documentation to coordinating with certifiers - helping owners achieve certification that enhances their market positioning.

Participation in green certification programs opens access to financing options tied to sustainability performance. Agents help connect shipowners with banks offering sustainability-related loans and grants, providing additional incentives to pursue green initiatives.

THE BUSINESS CASE FOR SUSTAINABILITY IN SHIP AGENCY SERVICES

Sustainability is no longer just a moral or legal requirement; day by day, it is becoming a key element for business success. For brokers and ship agents, it means adapting to sustainable practices, and it offers multiple benefits such as lowering costs, improving reputation, and securing long-term success in a continuously changing industry.

COST SAVINGS AND OPERATIONAL EFFICIENCY

One of the most immediate advantages of sustainability in ship agency services is the potential for cost savings and operational efficiency. Practices such as Just-In-Time (JIT) arrivals, digital documentation, and optimised scheduling result in reduced fuel use and shorter port stays. These practices align with environmental goals while lowering expenses related to fuel consumption, demurrage, and idle time. For example, during a recent coordination in the Adriatic region, my team facilitated digital pre-clearance and synchronised pilot services, reducing a vessel's port call by nearly eight hours, which translated into measurable fuel savings and cost reduction.

Additionally, energy-efficient technologies and operational improvements improve the vessel's performance rating, further reducing future regulatory costs and non-compliance penalties. Moreover, the implementation of AI-based tools and predictive analytics allows agents to anticipate challenges and optimize resource use.

ENHANCED MARKET POSITIONING AND CLIENT TRUST

Environmental responsibility is increasingly becoming an important duty of every business executive. Ship agents who offer green services, advice on emissions reduction, and access to cleaner fuels gain a competitive edge, since charterers, cargo owners, and port authorities are becoming more prone to collaborating with partners who demonstrate environmental responsibility[16].

For instance, choosing an agency to handle a sensitive shipment is based on prior business experience, their attention to detail, and their dedication to low-emission operations and green-certified ports. This strengthens client loyalty and opens new business opportunities focused on sustainability.

LONG-TERM BENEFITS AND INDUSTRY RESILIENCE

Sustainability adoption strengthens long-term competitiveness and adaptability. As decarbonization targets tighten and public scrutiny intensifies, companies that do not prone to focus on sustainability risk damage to their reputation, fines, or losing market access[17].

In contrast, agents who integrate sustainable practices into their operations are better prepared to navigate regulatory changes and evolving client demands. This attracts investment, access to green financing, and inclusion in sustainable supply chains. Industry reports show that sustainability-linked financing can offer reduced interest rates, while certified green operations are increasingly recognized as prerequisites for high-value contracts[18].
By aligning environmental responsibility with financial and strategic gains, the business case for sustainability in ship agency services becomes clear. It is a pathway to smarter, more adaptive, and more profitable operations in the maritime industry.

CONCLUSION

The role of ship agents and brokers in driving maritime sustainability is no longer a peripheral consideration, yet central to the industry's transformation. As this paper has demonstrated, agents are evolving from traditional intermediaries into proactive enablers of decarbonization. Drawing from the mentioned cases across the Adriatic and Mediterranean regions, this study highlights how agents and brokers are integrating regulatory compliance, operational efficiency, and commercial strategy to create a more sustainable shipping ecosystem.

The analysis has shown that regulatory frameworks such as the IMO's GHG Strategy, EU ETS, and the CII are setting ambitious emissions targets, as well as reshaping the operational landscape for vessels. Agents have become crucial facilitators of compliance through Just-In-Time arrivals, digital documentation, and AI-based scheduling. These tools reduce carbon emissions and generate measurable cost savings and operational efficiencies. The transition to alternative fuels like LNG, methanol, and hydrogen further demonstrates the complexity of maritime sustainability. Ship agents' ability to coordinate bunkering logistics, secure regulatory approvals, and provide practical guidance on compliance is indispensable in this context, which was shown in depth with personal experiences coordinating green bunkering operations.

Beyond compliance, the market dynamics analysed in this paper reveal that sustainability is increasingly a key determinant of competitive advantage. Charterers, cargo owners, and financiers are prioritizing green credentials in their decision-making processes, while ports and regulators offer tangible incentives for eco-friendly practices. Agents who embrace these trends are supporting vessel operations, as well as enabling access to high-value cargoes, securing preferential financing, and cementing their reputation as forward-thinking service providers. This shift is reinforced by case studies such as the DNV and BIMCO Green Ship Certification initiatives, which demonstrate how certification and compliance can translate into both environmental and commercial gains.

The implications of this shift are far-reaching. As environmental regulations become more stringent and industry expectations continue to grow, ship agents and brokers who do not adapt to sustainability demands may find themselves increasingly sidelined. In contrast, those who integrate environmental considerations into their core operations will strengthen their competitiveness. By doing so, they enhance their ability to attract investment and build strategic alliances.

In essence, this paper reconsiders the traditional view of ship agents as passive facilitators and presents a compelling case for their centrality in maritime sustainability. As the industry confronts rising regulatory pressures and environmental responsibilities, these actors are uniquely positioned to influence outcomes through regulatory acumen, operational coordination, and client-driven innovation. By stepping beyond traditional functions and embracing sustainability as a core mandate, ship agents can help shape a more resilient and responsible maritime future—delivering measurable value not only to their clients, but to the sector as a whole.

Moving forward, meeting the demands of decarbonization will require more than compliance. It will make steady investment in technology, closer cooperation with fuel suppliers and port authorities, and a commitment to keeping pace with evolving regulations. Just as importantly, agents must take the lead in promoting a shared responsibility for environmental performance across the supply chain. Those who succeed will not only meet the expectations of today's market, but they will help define the future of the maritime sector.

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NAVIGATING AI – IMPACT & TRANSFORMATION OF DRY CARGO SHIPBROKING

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2025

NAVIGATING AI - IMPACTS & TRANSFORMATION OF DRY CARGO SHIPBROKING

OTTO HILLERSTRÖM

SWEDEN

INTRODUCTION

This study will examine the impact of Artificial Intelligence (AI) on the dry-bulk shipbroking profession within the coaster sector, focusing on both opportunities and challenges during the next decade. AI has already begun influencing the shipping market through digital platforms, data analytics, and other AI-enhanced tools. AI is still in uncharted territory regarding the general technique, specifically for the market segment of coaster dry bulk shipping. In this sector, it remains uncertain if and how AI may enhance or transform the traditional role of market practitioners and the potential pitfalls that may arise as technology advances. Will the shipbrokers' role change significantly, or will it almost disappear? The future of AI in coaster dry-bulk shipbroking relies on various perspectives and its transformative potential. While some industry professionals believe AI will revolutionize shipbroking within the next decade, others emphasize the irreplaceable role of human expertise, intuition, and relationship management. Will this study conclude that AI will serve as a valuable tool in shipbroking rather than a replacement for brokers, enhancing operational efficiency while requiring human oversight to maintain industry standards and credibility? Could it mean spending more time on relationship building and customer care rather than purely administrative tasks? Some of these solutions are part of the broker's daily work today, just through other systems, and that could be more efficient and might not seem as dramatic as it can.

PROBLEM IDENTIFICATION

The goal and ambition of this paper is to understand how the current AI trend is affecting shipbrokers' daily work. Moreover, what are the potential risks and benefits of using AI applications, and what does the future have in store for shipping executives deciding to use and develop their business with artificial intelligence? To bridge the gap between the current and future AI-driven dry cargo shipping environment, AI's strengths and weaknesses need to be explored and evaluated. Four different hypothetical strategies can be developed to best serve the needs of dry cargo shipping executives. However, each logical chain starts with a clear objective that addresses the problem formulation.

OBJECTIVE

The objective of this paper is to analyse and evaluate how Artificial Intelligence, based on its strengths and weaknesses, may affect which strategy a shipping professional may choose to manage future opportunities and threats within the macro business environment.

Hence, the main objective of this paper is:

How may AI affect the business microenvironment within the dry-bulk coaster sector in the coming years, and what strategy may shipbrokers select to best take advantage of this application in the macro business environment?

To answer the main objective of this paper, the following two research questions will be addressed.

1. What is Artificial Intelligence, and to which areas of the dry-bulk shipping macro and microenvironment are presently applied?
2. Which strategies for AI implementation are available to shipbrokers within the dry-bulk coaster shipping segment?

Data for each research question and model have been collected, forming a valid research design. Each question is based on established literature and a survey sent to different market practitioners: 1) Charterers, 2) Shipbrokers, 3) Shipowners. The two research questions aim to understand the consulted shipping executives' AI macro and microenvironments. Additionally, what strengths and weaknesses does AI have in the dry cargo coaster shipping segment? This will help develop a viable strategy for dry cargo coaster shipping executives, addressing the paper's objective.

SCOPE AND LIMITATIONS

This paper is limited to the dry bulk short sea shipbroking segment and its associated fields of practice areas: relationships, negotiations, operations, and know-how. Due to the secretive nature of the business and unwillingness to give up business advantages, the questionnaire will only be general to establish how AI is evolving in the industry. It is believed that the accuracy of the survey results is significant concerning the specific objective and research questions addressed in this paper. In addition, the lack of previous studies on the topic makes it difficult to obtain comprehensive material. Therefore, the purpose of this paper is not an in-depth analysis of AI; instead, it will only serve as a study trying to understand how AI will impact the coaster dry bulk shipping sector.

STRUCTURE AND APPLIED METHODOLOGY

This paper consists of two parts: 1) SWOT analysis and 2) The Ansoff Matrix. The SWOT analysis constitutes the core part of this paper as it provides the foundation for the strategies and suggestions developed in the Ansoff matrix. The details from the “FONASBA” questionnaire and already published material on AI aim to identify common grounds and potential contradictions between the perspectives, enabling understanding of AI’s potential impact on the shipping sector (Fig. 1).

Figure 1 Showing paper structure and methodology Authors design 1st May 2025.

SWOT METHODOLOGY

The SWOT analysis aims to identify the Strengths, Weaknesses, Opportunities, and Threats related to AI applications in the dry cargo shipping micro and macroenvironment across the following segments: i) Shipbrokers, ii) Shipowners, and iii) Charterers. Gaining a deeper understanding of how the AI application works is advantageous when developing strategic planning and decision-making.

ANSOFF MATRIX METHODOLOGY

The Ansoff Matrix is a strategic planning tool for identifying and developing growth strategies. It has been adapted based on the findings in the SWOT analysis and to find out how AI can facilitate future business expansion in the three previously mentioned segments. Categorized into the following: 1. Market Penetration, 2. Market Development, 3. Product Development, and 4. Diversification. The four strategies are evaluated based on their risk and reward profiles. One is presented as the most suitable option and is believed to offer the most significant benefit to the dry cargo shipbroker.

PRIMARY AND SECONDARY DATA SOURCES

Primary data was collected by sending out a questionnaire (appendix 7) to ship owners, charterers, and shipbrokers in the dry cargo coaster shipping segment, with the specific purpose of answering the objective of this paper. Other sources of information are collected from web pages and online articles, such as the Harvard Business Review. They are considered secondary data that serve as a good complement to the research questions.

RELIABILITY AND VALIDITY OF DATA

The survey's reliability and validity depend on the data provided by interviewees. There is no reason to believe that the respondents have had any reason to withhold or distort the information given other than for the protection of business secrets. Therefore, the survey questions are general and formulated in multiple-choice form to avoid going into too much detail. Moreover, giving the interviewee full anonymity is believed to increase the reliability of their answers. Secondary data was compiled from reputable, trustworthy, and updated sources. When possible, primary and secondary data have been compared to verify the reliability and validity of the information. Finally, to ensure peer review of this paper, two market practitioners independent of each other, Mr. Martin Alm and Mr. Carl Hillerström, have examined this paper."

A BRIEF INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Artificial Intelligence (AI) refers to the capability of computer systems to perform tasks that require human intelligence. These tasks include learning from executing different tasks and improving their results. As well as analysing large data sets with algorithms to generate references and summaries of certain aspects in texts. (McKinsey & Company, 2024)

Different types of AI serve various purposes. Natural Language Processing (NLP) Example: Google Translate. Computer Vision Example: Facial recognition, medical image analysis. Generative AI Example: DALL-E (image generation), DeepSeek (text generation), ChatGPT. Autonomous AI Example: Self-driving cars (Waymo – self-driving taxi). (Stanford (HAI), 2025)

Both regulations and the underlying technology behind AI are continuously advancing. As a result, some aspects remain uncertain, particularly those related to data security and the deployment of autonomous systems. In its current state, AI often depends on human oversight in various forms, whether for understanding results, making key decisions, or grasping broader implications of its outputs. Many AI applications function as supportive tools that require human input and judgment rather than being fully autonomous agents. (NCSC - National Cyber Security UK, 2024)

Different challenges still impact AI implementation, particularly around integration. In practice, AI systems are only as effective as the data and programming behind them. If the foundation is weak, due to missing, outdated, or poorly structured information, the output will reflect those weaknesses. (Schmelzer, 2023)

Furthermore, energy consumption is a factor to consider regarding Artificial intelligence, and AI data centres consume up to 1% of global electricity, a figure expected to rise sharply with growing AI adoption. Hence, this means that AI applications are not environmentally friendly and underline the urgent need for energy-efficient hardware. (Zewe, 2025)

Within the shipping industry, AI can be applied to a wide range of applications, which include:

1) Market analysis and forecasting

2) The Negotiations process

3) Email automation

4) Voyage estimation

5) Accounting

6) Risk assessment

7) The automation of chartering processes.

It was further confirmed in the “FONASBA questionnaire” that question number one asked the interviewees which areas of the commercial dry-bulk shipping business they believed AI could be applied to, and their answers are shown in Figure 2.

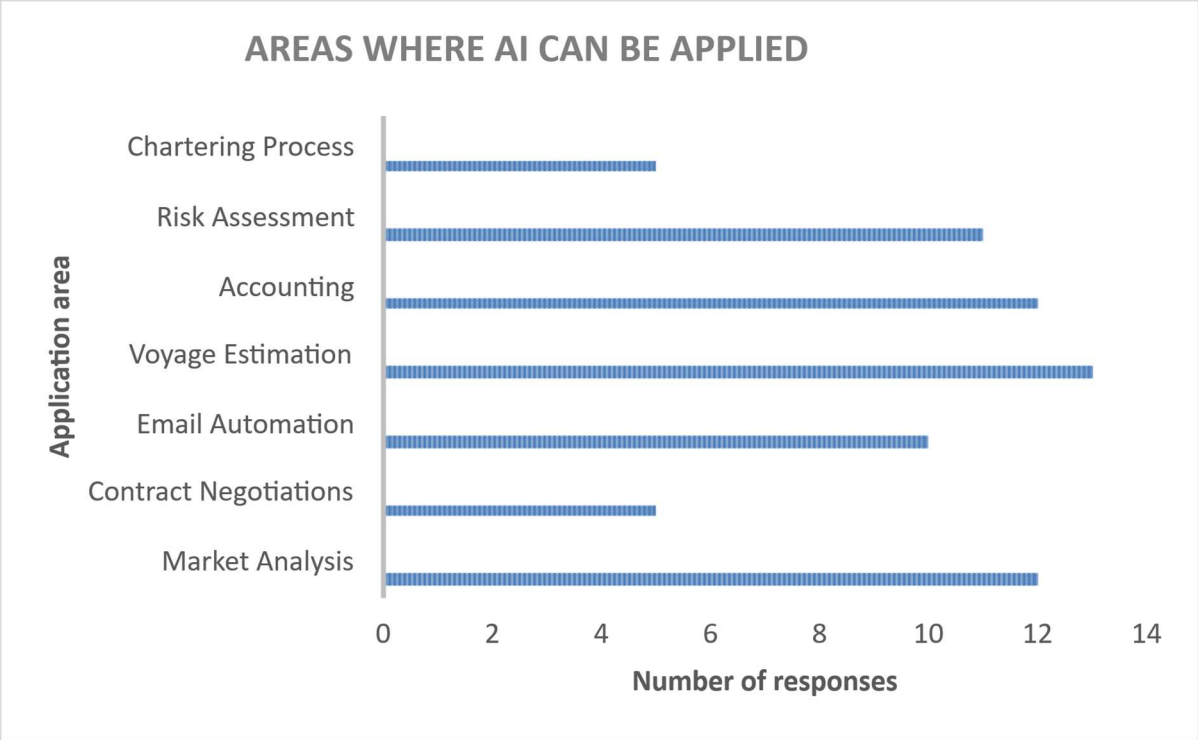

Figure 2 Showing interviewees' response to question number one in the questionnaire (Appendix 1). Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström

However, when asked, only 24 percent of the interviewees had to some degree implemented AI tools in their daily business activities; hence, AI is not yet a common trait within the shipping dry bulk coaster shipping segment (Fig. 3).

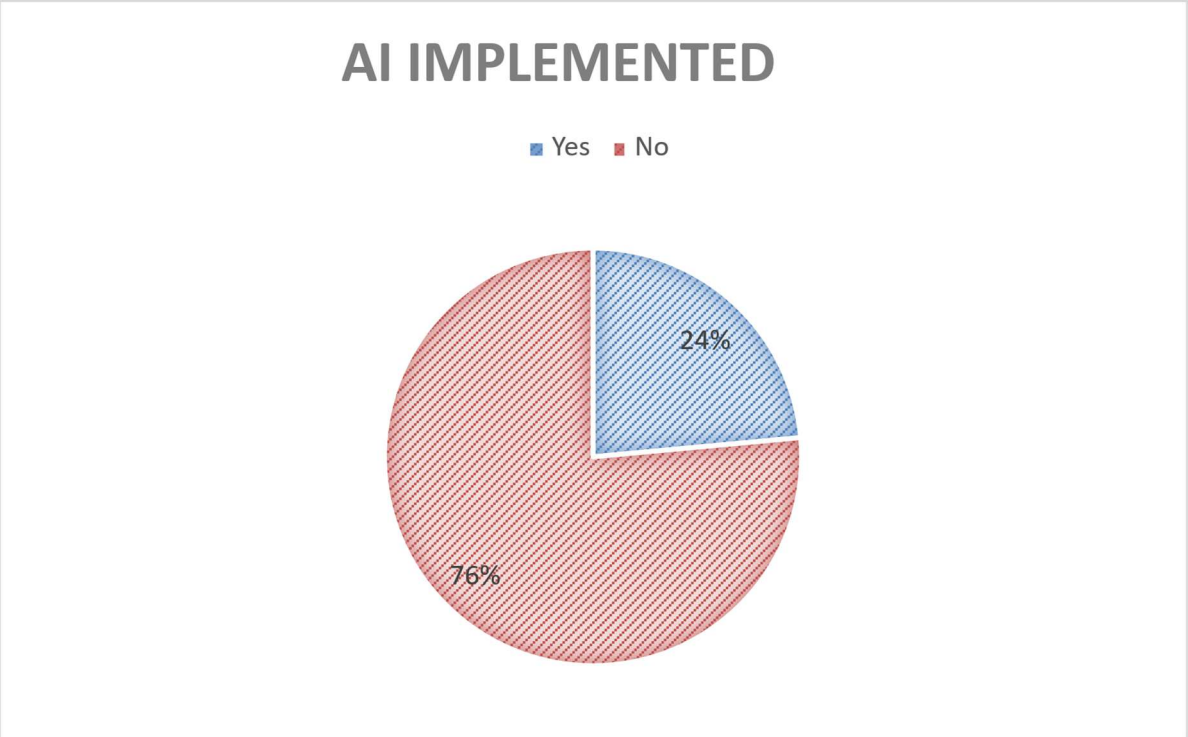

Figure 3 Showing how many of the interviewees have implemented AI in their daily business routines. (Appendix 1.) Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström, respondents were also asked:" To what extent is the belief that AI will revolutionize the shipbroking industry. Only received a mild optimism that it will revolutionize within the next decade (Fig. 4).

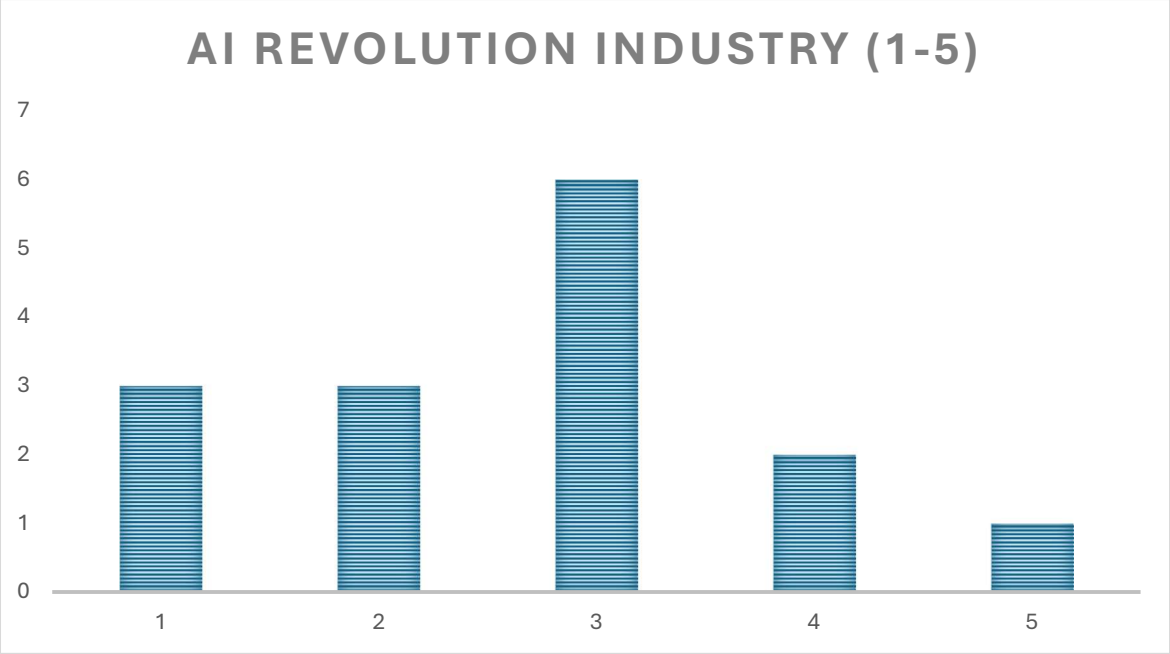

Figure 4 Indicates the belief in the AI revolution held by the interviewees. 1 Strongly Disagree to 2 Strongly Agree (Appendix 2). Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström

This chapter points out issues connected to question 1: what is artificial intelligence, and to which areas it can be applied.

MARKET ANALYSIS AND FORECASTING

Market analysis and forecasting are one of the areas where AI can provide substantial support. AI systems can process large volumes of market data to identify trends and generate forecasts related to freight rates, demand across specific trade routes, and commodity flow patterns. (Pansare, 2024)

However, it is important to emphasise that forecasts produced by AI still require validation through additional human resources and expertise. No prediction model is entirely self-sufficient, and relying solely on algorithmic outputs without cross-referencing may lead to incomplete interpretations. The Baltic Exchange notes that while AI can transform the transport sector by optimizing routing, reducing fuel consumption, and improving overall safety, it also introduces new risks. Concerning cybersecurity, data privacy, and the regulatory implications of rapidly evolving AI technologies, these factors continue to shape how quickly these systems can be adopted within the shipping industry. (Fields, 2024)

THE NEGOTIATION PROCESS

The heart of shipbroking rests on personal relationships and trust. The maritime industry is built upon long-standing networks and credibility between shipbrokers, shipowners, and charterers. Emotional intelligence, the art of negotiation, and the ability to manage nuanced interactions are qualities that artificial intelligence cannot currently copy. While AI can support operational efficiency and provide valuable insights, it cannot replace the trust brokers have built for years. Experts across the field continue to stress that technology may enhance the broker's toolkit, but it does not replace the need for authentic personal relationships. (Murphy, 2023) As an example, most interviewees think that AI will not replace human interaction (Fig. 5)

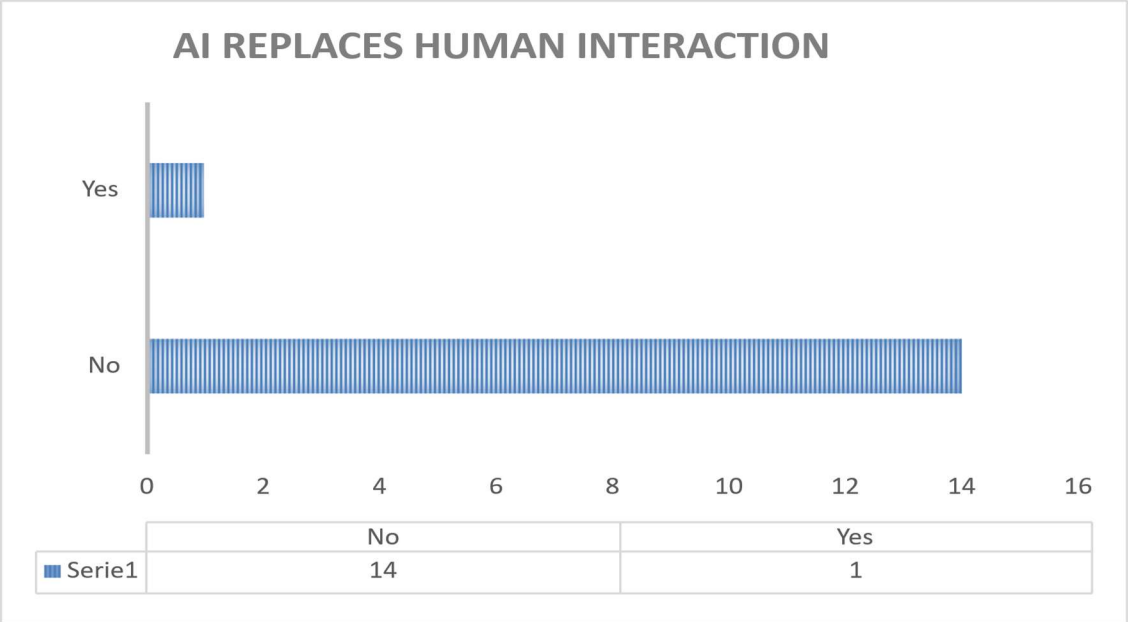

Figure 5 Illustrates that only one interviewee out of 15 participating in the survey thought that AI will replace human interaction (Appendix 2.). Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström

A recent industry debate similarly underscored that many shipowners are reluctant to share sensitive information with algorithms; “people, especially shipowners, will not reveal their secrets to a machine”, explained one senior broker, highlighting a continued preference for human brokers as trusted intermediaries. (Howard, 2024)

AI-powered networking tools, such as platforms that use algorithms to match cargoes with suitable vessels, can potentially connect parties who might not have encountered each other through traditional industry networks. This capability can expand a broker's reach, opening new business opportunities beyond their established client base. This view is also shared by interviewees in figure (fig 6)

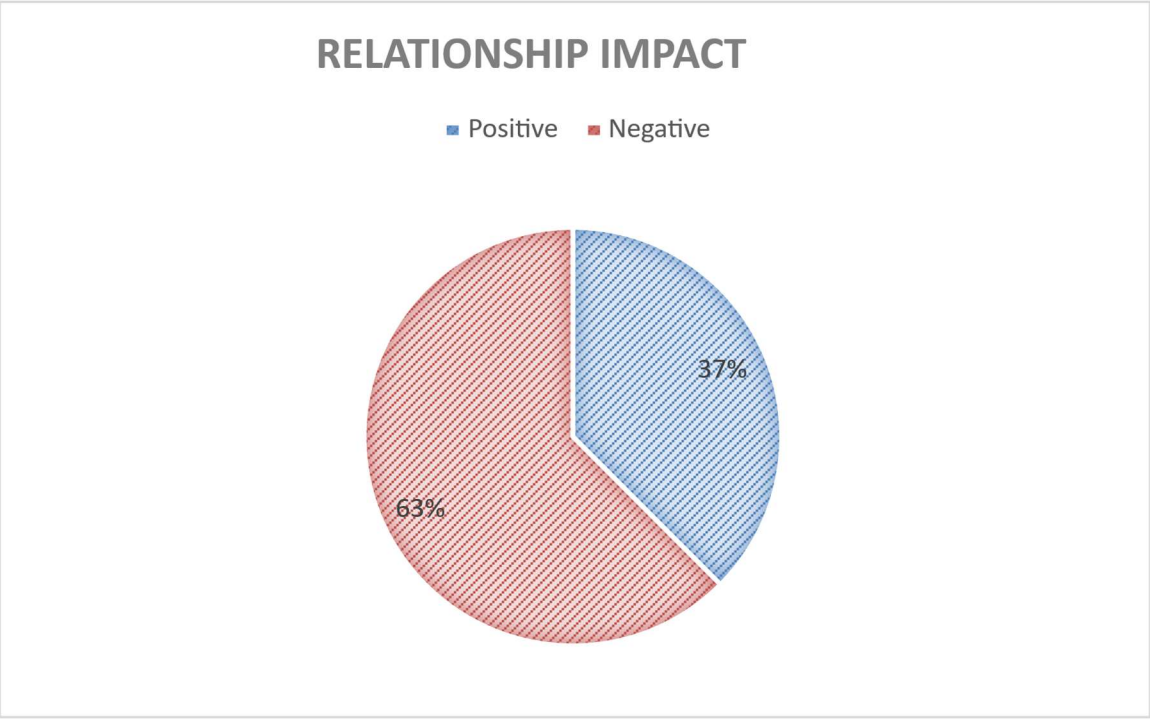

Figure 6 Shows how interviewees thought AI may impact personal relationships (Appendix 2.). Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström

There is concern that over-reliance on AI tools may erode the personal connection and loyalty that typically develop in long-term broker-client relationships. Research into maritime digitalization indicates that a fully developed global e-charting marketplace could indeed make shipping transactions more transparent and competitive, but it could also render them more impersonal and standardized, potentially diminishing the nuanced, trust-based interactions that have long defined the shipbroking profession (Evi Plomartiou, 2022). In the early 2000s, several e-chartering marketplaces attempted to automate the fixing process by enabling shipowners and charterers to complete deals through online bidding systems, aiming to eliminate the need for brokers. However, these initiatives largely failed. (Batrinca, 2007) Because machines and platforms lack the flexibility and emotional intelligence required to navigate the high-stakes negotiations (Mirra, 2025).

AI can support decision-making by offering data-driven insights and streamlining certain processes; however, it cannot replace the human intuition and trust required in closing fixtures successfully (Döhle, 2024). This distinction was reinforced in the interviews, where most respondents agreed that AI tends to reduce the intuition, as shown in Figure 7. The

responses suggest that while AI is a valuable tool, it may risk undermining the interpersonal aspects in shipbroking.

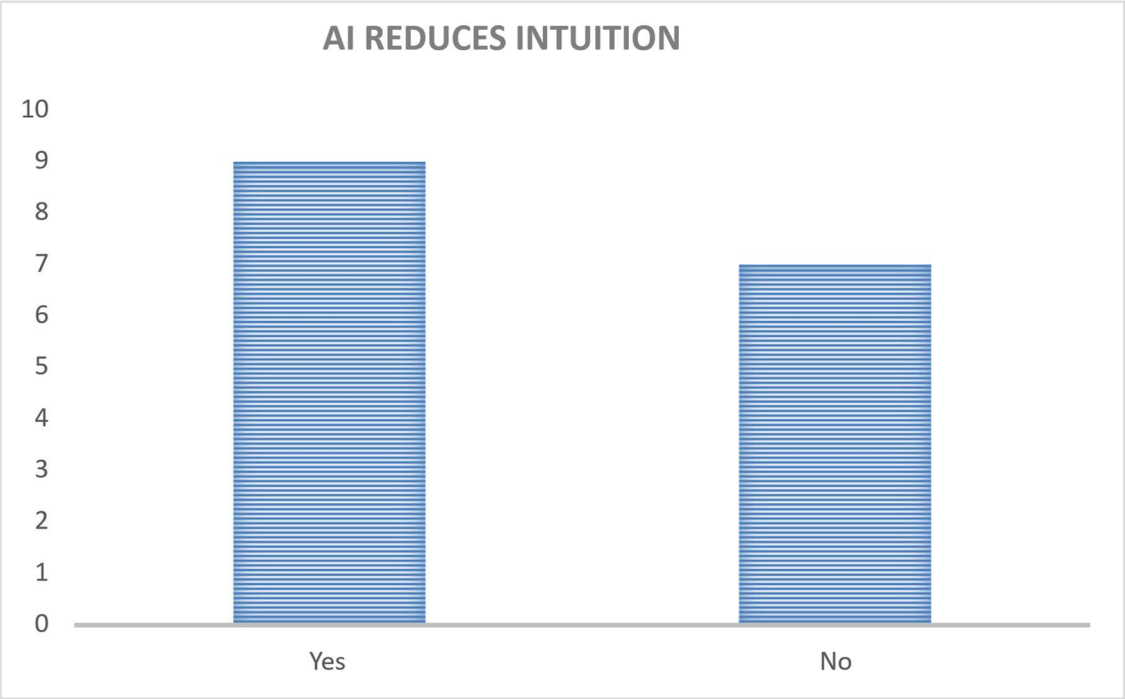

Figure 7 showing that a majority of the respondents of the survey were of the opinion that AI applications reduce human intuition (Appendix 3). Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström

EMAIL AUTOMATION

AI in communication has the capability of computer systems to specify unstructured communication data, identify critical information, and help to manage the flow of emails and market information that shipbrokers handle daily.

Despite these advances, AI implementation faces several challenges. Communications within the shipping sector often use a wide variety of templates, abbreviations, and language, complicating the training and reliability of AI systems. Models trained on a single company's data may struggle to generalize across different firms, requiring continuous data preparation and model adjustments. This makes it both time-consuming and costly, where human validation remains essential. (Irmina Durlik T. M., 2024) This is also verified in the survey, where most respondents thought AI optimization of email was valuable (Fig.8); however, only a few used this application (Fig.8).

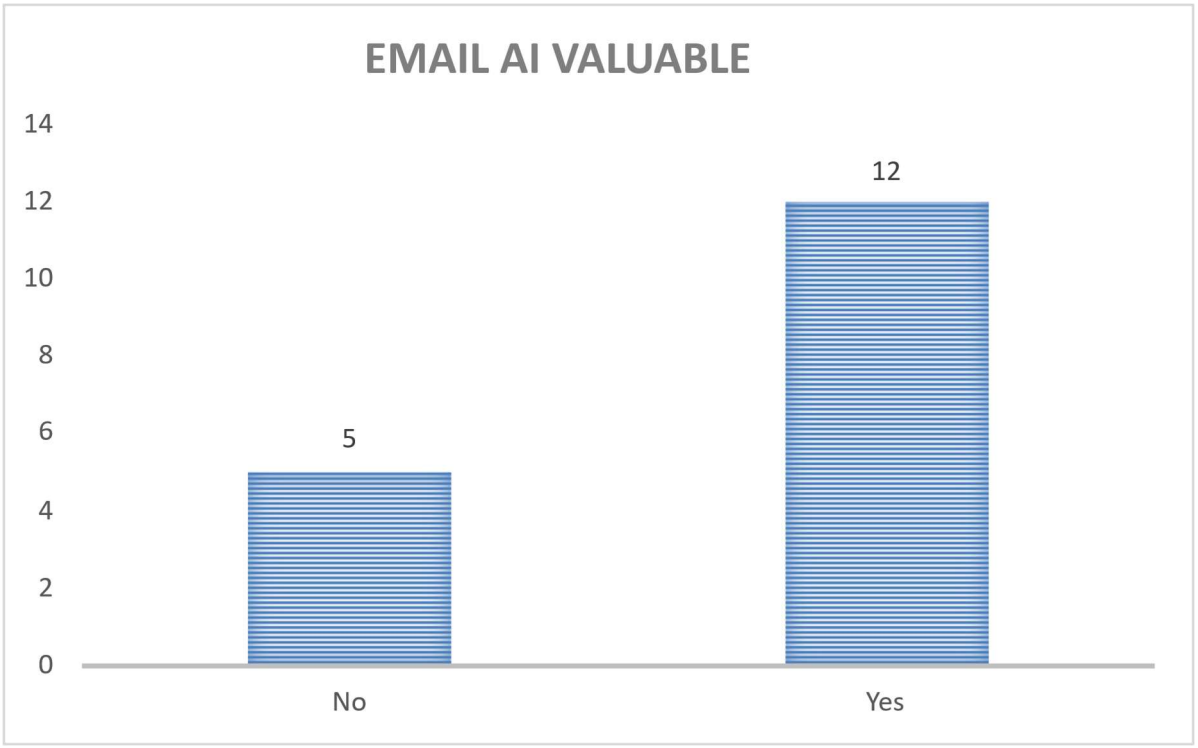

Figure 8 shows that the majority of the interviewees in the FONASBA questionnaire thought that AI optimization of email may be valuable (Appendix 3). Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström

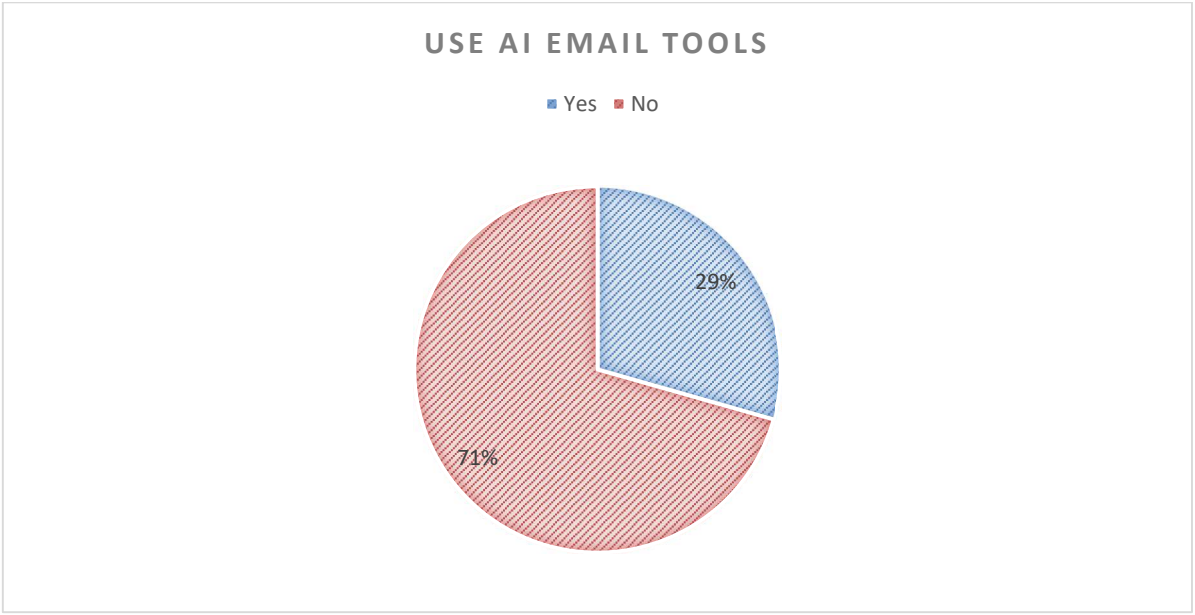

Figure 9 showing how many of the interviewees were using AI tools in their daily work environment (Appendix 3.). Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström

One example illustrating the benefits of AI-driven email automation comes from a business case between the email management platform Sedna and NORDEN, one of Denmark's oldest and largest shipping companies. NORDEN implemented an AI-based system capable of auto-categorizing and sorting emails in real time. The system utilized tagging mechanisms, shared inboxes, and search functions to ensure that high-priority messages. Integration with

NORDEN's VMS (Voyage Management System) further reduced manual sorting. This streamlined process enabled quicker access to critical information and reported a reduction in internal email traffic by approximately 50%. (Sedna, 2025)

VOYAGE ESTIMATION

AI applications used to support voyage estimation processes face challenges in consistency and integration. One of the most significant risks lies in the quality and accuracy of the master data. Any time saved through automation may be lost in verifying and correcting the outputs if the underlying data is incorrect or incomplete. (Schmelzer, 2023)

"About calculations," even if automated, caution is required. For example, port tariffs or agent fees are often only indicative and, in many regions, cannot be openly published. (Institute of Chartered Shipbrokers, 2020). This means that the final figures must still need to be confirmed manually despite the availability of automated tools to avoid discrepancies.

AI-driven calculations can offer valuable first approximations and be quite accurate under the right conditions. Still, if used without verification, they can lead to decisions based on flawed assumptions, resulting in deviations from original expectations or financial outcomes. On a more positive note, because many AI models learn and improve through repetition and continuous data input, their accuracy and reliability could increase over time, provided by consistent user engagement and data validation. (Irmina Durlik T. M., 2024)

ACCOUNTING

Different AI functions are being integrated in accounting, particularly in bookkeeping and financial forecasting. In bookkeeping, AI automates transaction classification, invoice matching, and account reconciliation tasks. By using machine learning, these systems categorize expenses and match payments automatically, boosting accuracy and efficiency. (Fadi Bou Reslan, 2024)

Moreover, AI tools can be applied to automate time tracking connected to ship calls at different ports, by automating laytime calculations and extracting data from Statements of Facts (SoF). Indicate inconsistencies and accelerate the preparation of claims. Furthermore, integration with voyage management (VMS) systems allows for precise cost tracking. (Burmester-Vogel, 2025)

In accounting, the authentication of certain decisions and records is often regulated by law or professional standards to ensure transparency, accountability, and legal validity. This is especially relevant when systems like AI make decisions, raising questions about responsibility, traceability, and compliance. Directive (2013/34/EU). With AI systems suggesting or executing accounting actions, such as auto-categorizing entries and initiating invoice payments, it's crucial that Human authorization and oversight are retained for critical decisions. Finally, decision logs are to be maintained that document: What the AI recommended, who approved or overrode it, and on what basis the decision was made. EU AI Act, still under draft but relevant in regulations to AI (including those used in finance), has

to maintain these matters. (European Commission, Directorate-General for Communications Networks, Content and Technology, 2021)

RISK ASSESSMENT

Risk assessment in dry bulk shipping shows potential in the ability of AI to recognize and act on patterns that would otherwise be difficult to detect. AI systems today can process historical voyage data, port call logs, incident reports, sanction lists, restrictions, and external factors like weather forecasts to provide real-time risk indicators. (Raiten, 2025)

Lloyd's List has a tool named "Seasearcher Trade Risk platform". This tool reflects the possibility of detecting trade finance fraud; it also now offers comprehensive voyage-level risk screening across bulk segments. Through continuous monitoring of vessels, ports, cargoes, and counterparties, platforms like these can highlight suspicious patterns. Including repeated cargo damage, high-risk berths, or contract disputes. (Lloyds intelligence, 2025)

In the scenario that AI detects a certain vessel or charterer consistently associated with delays or damage claims and commercial disputes, for example, many arbitrations. The system could issue alerts prompting decision-makers to consider alternatives to reduce exposure. Similarly, predictive weather-routing models can advise risk mitigation strategies by analysing historical storm patterns and linking them to prior cargo incidents. (Munoz, Barkley EDU, 2024)

AUTOMATION OF CHARTERING PROCESSES

Artificial Intelligence (AI) in the dry cargo chartering process can assist in streamlining the administrative side of fixture execution, such as email summary, recap generation, and data extraction from fixture-related correspondence. As earlier described under email automation, the NLP-driven systems can extract terms from emails to populate contract templates to reduce initial manual inputs. (Sedna, 2025)

Models rarely translate directly into commercial maritime practice. Relationship dynamics influence chartering negotiations, evolving market sentiment, and reputation; these factors are difficult to apply in machine-readable terms. Consequently, AI systems are unlikely to replace human negotiators, and their current role remains advisory at best. In practice, they may suggest standard responses or highlight market benchmarks, but the nuanced judgment required to conclude a successful fixture still lies with experienced practitioners. (Peacock, 2025)

Further limitation lies in the nature that many AI models (especially machine learning models) make decisions in ways that are not fully visible, understandable, or explainable to humans, which conflicts with the need for explainability and legal accountability in contract negotiations. (Chakravorti, 2024)

These technologies can take over routine and repetitive tasks such as document management, data entry, or email automation, freeing up time for shipbrokers to concentrate on more strategic aspects of their role. This opens the door for brokers to

provide more advisory services to their clients. However, as AI becomes more integrated into daily operations, there may also be an increased demand for strategic oversight, ensuring that automated suggestions align with commercial realities and client-specific needs. In this context, the broker's role evolves, but it remains essential. (Allison, 2024). The risk of job displacement in replacing some repetitive tasks, as technology becomes more established and accepted, is noted in a survey. (80%) (fig. 10)

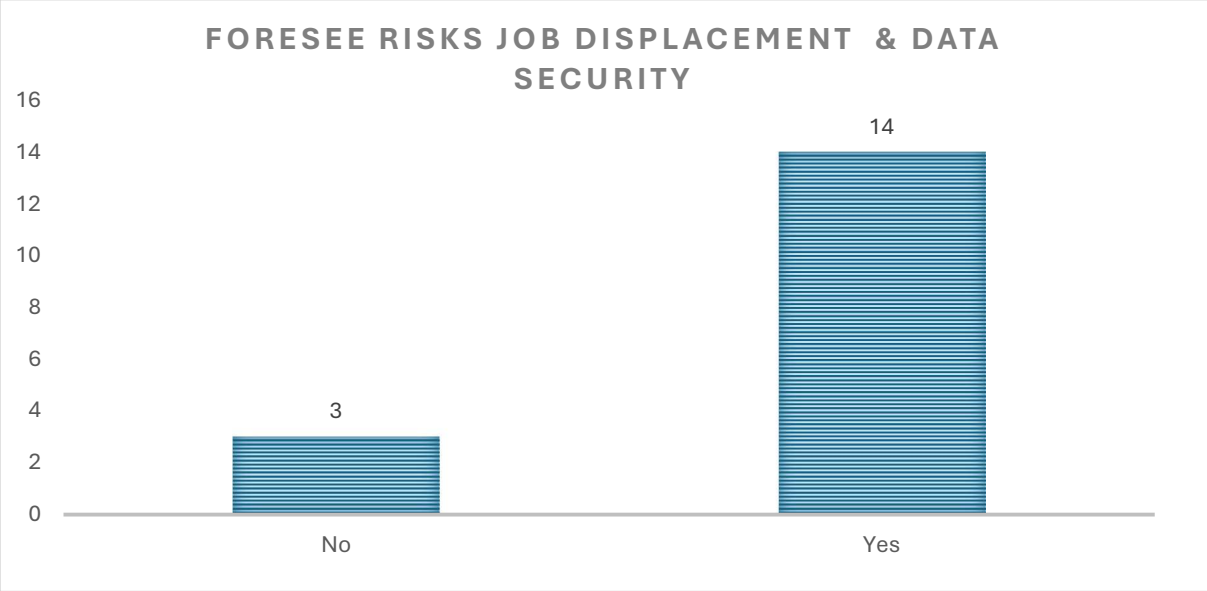

Figure 10 Showing how the survey respondents see the risk of job displacement & data security (Appendix 4) Authors designed 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström

It remains essential to confirm the intentions and to get approval from the principals involved to avoid breaching the terms of the warrant of authority. If incorrect information is processed or relied upon, it may lead to misrepresentation or legal and financial issues. (Munday, 2016)

RISKS RELATED TO ARTIFICIAL INTELLIGENCE

The increasing use of AI in shipping brings risks. Some risk factors include data quality, cybersecurity, explainability, accountability, regulatory compliance, and overreliance on AI at the expense of human judgment and interactions.

AI systems are sensitive to the quality of data they are trained on. In the maritime sector, data can be fragmented or error-prone, such as inconsistencies in market databases. Predictive models are only as good as the data on which they are based, and poor data quality or missing and biased information can lead to incorrect results. (Irmina Durlik T. M., 2024)

Email automation, predictive maintenance, or navigation assistance systems must interface with corporate networks and even vessel systems, presenting attractive targets for hackers. The maritime industry has seen a rise in cyber activity, making resilience against cyberattacks important. (Reberio, 2022) For instance, a compromised AI system could send falsified

communications (in a chartering negotiation context) or disrupt operations by feeding bad data to decision-makers.

The regulatory environment for AI is evolving, and handling it is complex. There is a concern that current laws and industry rules have not caught up with technologies, creating uncertainty about liability and acceptable use. AI integration faces regulatory issues and needs a framework to ensure safer implementation. (Irmina Durlik T. M., 2024)

Furthermore, belief in artificial intelligence will impact human expertise and intuition, which have long been central to the shipping industry. AI outputs without applying critical judgment, and AI can't capture the full context of complex shipping decisions. (Kendrick, 2022). Research on supply chain AI warns that over-reliance on algorithms can lead to human oversight, which is crucial in handling unforeseen events and complex decision-making. Scenarios that AI might not yet be fit to handle. (Ibal, 2023). In contrast, the interviewees believed that AI would enhance collaboration and efficiency of the supply chain (Fig. 11).

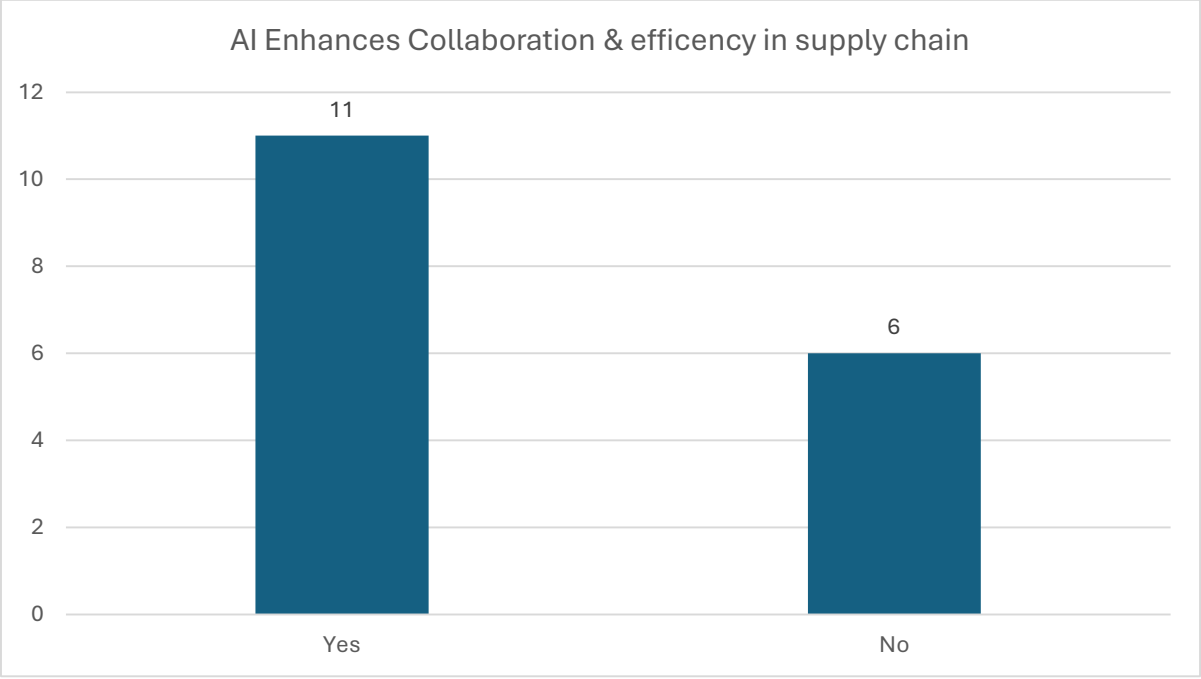

Figure 11 Showing how interviewees thought about AI enhancing the overall supply chain (Appendix 4). Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström

Data privacy regulations differ between the West (EU & USA) and other parts of the world. These differences impact how artificial intelligence (AI) is applied. The General Data Protection Regulation (GDPR) treats privacy as a fundamental right in the EU. It imposes strict consent rules and transparency requirements that slow rapid AI deployment, but protect individual liberties. (European Commission Data protection, 2024). The USA lacks a comprehensive privacy law but uses a patchwork of sector-specific regulations. (Decision Foundry, 2024). Both regions emphasize privacy and human oversight, which can limit how extensively AI is used for surveillance or data-sharing.

In contrast, others have fewer personal protection laws and permit widespread state surveillance. This structure enables tighter AI integration in shipping, as it could involve cargo scanning, facial recognition, and vessel tracking, without the same legal constraints. (Baptista, 2024)

Companies involved in shipping must handle this globally. Western companies face legal friction when deploying AI tools, especially when handling crew or customer data, while, for instance, certain countries may implement surveillance-backed AI systems with few restrictions. This will impact the way efficiency is achieved.

As UNCTAD and the IMO noted, global shipping must balance innovation with privacy and ethical oversight to maintain trust across jurisdictions. (Tejwani, 2024) Despite the previously mentioned risks, many interviewees believe that AI will improve the overall efficiency of the negotiation process in shipbroking (Fig. 12).

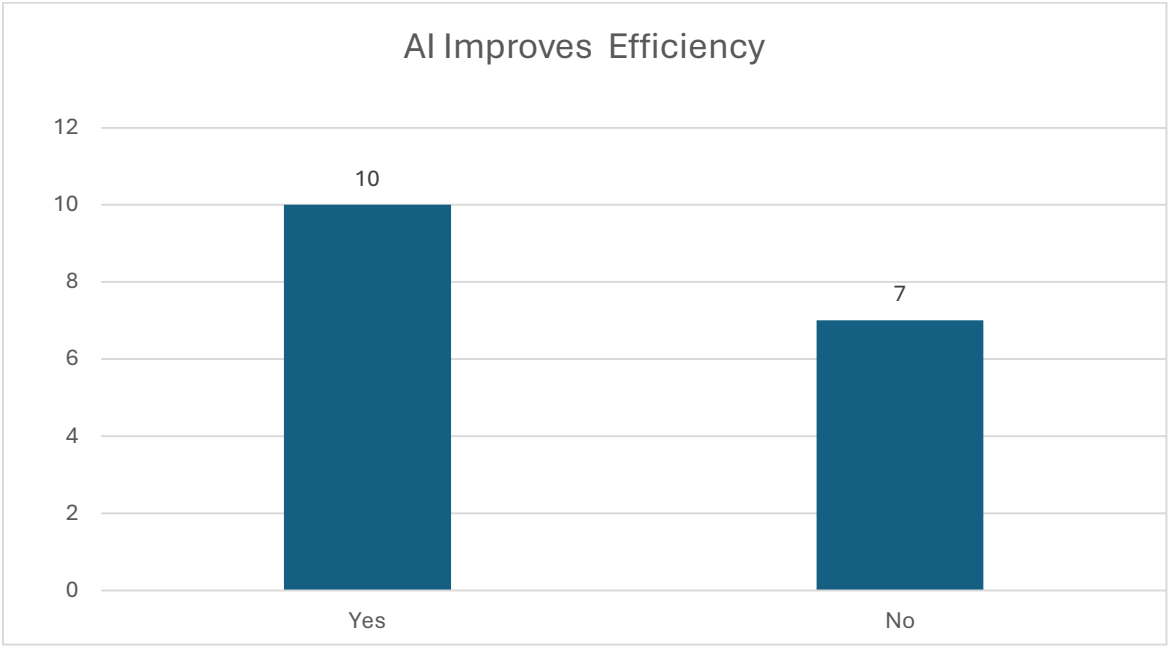

Figure 12 Showing whether respondents believe AI will improve efficiency of the negotiation process or not (Appendix 4). Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström

SWOT ANALYSIS

STRENGTHS

The survey identified several areas where AI offers benefits, which were backed up by already published information and verified sources. AI can be applied to well-structured and repetitive tasks, particularly email filtering as an example (NORDENS VMS auto sorting e-mail system) and document support, which were noted as effective ways to reduce manual workload. AI is a tool that can process large amounts of data, enhancing the accuracy and speed of the decision-making process and reducing time-consuming processes that can be

used to develop new business opportunities. Finally, AI may assess risks that are otherwise hard to detect.

WEAKNESSES

Despite its strengths in routine tasks, AI's limitations are evident in areas requiring human intuition. In the survey, respondents believed AI may negatively impact broker-client relationships and think AI reduces professional intuition. Another factor is reluctance to share sensitive business data with AI systems, reflecting concerns over data security, misuse, and the impersonal nature of algorithmic decision-making. These factors together restrict AI's broader possibility for adoption in more strategic and relational functions. Moreover, the main weakness with AI applications lies in the quality and accuracy of master data input.

OPPORTUNITIES

Results from the survey show participants do not believe in a revolution within the next decade. However, there is a belief in AI applications that support and improve various tasks. Furthermore, respondents highlighted that AI may enhance collaboration and productivity by taking over routine tasks, allowing brokers to focus on other matters such as client relations. Automating document management, email categorization, and data handling was seen as a benefit. As AI tools become more refined and integrated, their role in supporting operational workflows is expected to increase. Technological advancement presents a valuable opportunity for the shipping sector to leverage AI for increased efficiency gains, resulting in better productivity.

THREATS

Specific threats are linked to AI adoption, and 82 % foresee risks related to data security, commercial fraud, and job displacement, emphasizing concerns about employment and commercial confidentiality. Moreover, AI-powered cargo matching systems could undermine the loyalty and trust built by shipbrokers. In addition, the inability of AI to replicate emotional intelligence and nuanced negotiation skills poses a challenge in maintaining service quality. These factors collectively represent significant barriers to AI's widespread adoption in the human-centric environment of shipbroking. In the long run, high energy consumption and future environmental legislations could lead to higher AI operational expenses.

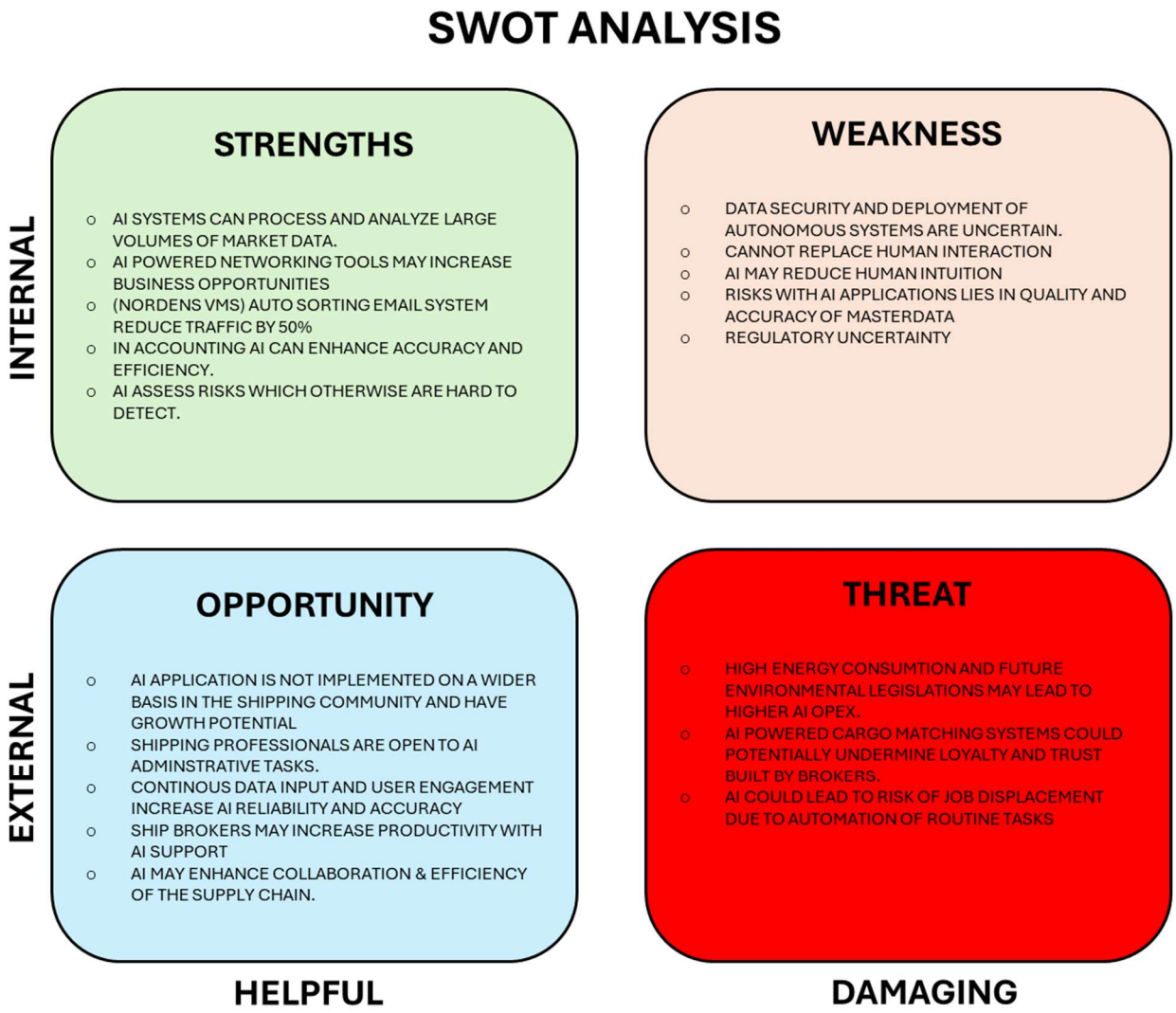

Figure 13 SWOT analysis showing AI applications; Strengths, Weaknesses, Opportunities & Threats. Authors design 1st May 2025

FORMULATING A VIABLE STRATEGY

This chapter points out issues connected to question 2: Which strategies for AI implementation are available to Shipping professionals within the dry-bulk coaster shipping segment?

It is essential to ask this question to develop and choose an effective strategy for AI implementation that can be applied to and influence the future of shipbrokers. The Ansoff market strategy has been used to define these: Market penetration, Market development, Product development, and Diversification.

MARKET PENETRATION STRATEGY

Efficiency increases by working with traditional shipbroking methods highlight that the broker's value lies in relationship management, emotional intuition, areas where AI is limited to impact.
The strategic Implication with this approach relies on refining existing workflows through process improvements rather than introducing AI. Example improved data handling or brokers may increase efficiency through standardized laytime calculations, risk profiling, or updated reporting structures. While it presents minimal risk and helps preserve trust and client relationships, it does not leverage AI's potential, offering limited innovation, which may serve the company; therefore, this strategy will not be further reviewed.

DIVERSIFICATION STRATEGY

This strategy is deemed high risk when entering a new market using AI and leveraging into the market. The SWOT analysis reveals limited support for applying AI in unfamiliar, relationship-based segments, particularly where trust, relationship building, and market knowledge are crucial. SWOT factors further highlight regulatory uncertainty.

-The Strategic Implication of this strategy is that each segment of Dry bulk is highly complex, and to then expand to enter the liquid bulk industry, for example, just by applying an unfamiliar AI seems unrealistic. The risk is overwhelming since market segments is quite different. Outcomes are difficult to predict, for instance, applying dry bulk centric AI models to tanker-specific practices as example fixtures with World scale against more individually negotiated freight rates as done in Dry bulk will make this too complex to overview just by applying AI tools. Due to the high risk, untested value, and weak survey support, this strategy is not considered for further review.

MARKET DEVELOPMENT STRATEGY

Market Development strategy is high reward, moderate risk. Findings from the SWOT analysis have resulted in this evaluation. The survey responses indicate that AI best supports voyage estimation, accounting, market analysis, email automation, and risk assessment. Tasks that are structured, repetitive, and are more administration heavy. However, legal and social factors suggest that adoption should be done gradually, with continued human oversight due to data privacy, trust, and accountability concerns. Furthermore, Email automation, for instance, can greatly reduce workload by classifying high volumes of incoming emails into predefined categories, flagging priorities, and generating summaries. The NORDEN case demonstrates a potential reduction in internal workload of up to 50%, though this depends on the specific systems and needs of the adopting company. The general results of applying this function are not statistically secure.

Moreover, when combined with risk assessment, voyage estimation can automate the comparison of routing and cost alternatives. This enables quicker decision-making and improves visibility on options that might otherwise be less prioritized due to time constraints.

Accounting tasks can also be semi-automated, improving accuracy and reducing manual effort. At the same time, market analysis tools can process large volumes of structured and unstructured data to deliver broad market overviews and segment-specific insights for short-sea shipping. Although service providers exist, such as Veson Nautical and Voyage X AI, these functions and their reliability need to be evaluated.
The strategic Implications of this strategy show that brokers can serve more clients without sacrificing quality, leveraging AI to enhance operations and assist in decision-making. As identified in the SWOT analysis, the strategy may differ depending on the stakeholder if it is a charterer, shipbroker, or shipowner, the size of the organization, and the current IT infrastructure. The survey shows that charterers are generally more open to AI tools, though all categories expressed certain initial interest, although they have limited current use and experience with this technology. Moreover, a step-by-step approach is advisable. It could be, for instance, to start with implementing basic email automation focused on categorization and summarization. Avoid fully autonomous tools like chatbots in early phases to remain in human control.

Voyage estimation and risk assessment are particularly useful for charterers and shipowners when making fixture decisions. This would also help validate master data before integration with systems like VMS (Voyage Management Systems), which would be a logical next step if the organization later aspires to go into more of a Product development strategy.

The main drawback of this approach is that it does not exploit AI's full potential. However, this ensures that brokers remain in control. Technology support, as mentioned earlier, will not replace human roles. AI is carefully reviewed before any broader adaptation. Given the predictable ROI (return on investment), lower implementation risk, and compatibility with current workflows.

Job displacement is not expected in the near term if the strategy focuses on support functions rather than relational or strategic roles.

PRODUCT DEVELOPMENT STRATEGY

From the Ansoff perspective, the product development strategy has a higher risk and could impact trust-based, intuition-driven tasks. The potential gains from such initiatives remain uncertain due to the limited use and knowledge of AI technologies adapted specifically for the short sea market, and the lack of clear political frameworks or regulatory alignment, as highlighted in the SWOT analysis. This means additional risk, particularly regarding data sharing with AI systems, which may be especially problematic in sensitive areas such as contract negotiation automation and chartering negotiations. Adopting this strategy may be more appropriate for companies with higher digital readiness and system integration. For instance, shipowners like NORDEN, who have already integrated AI with their Voyage Management Systems (VMS), could benefit more from adapting this strategy.

Energy consumption concerns and potential risks linked to fewer regulations in countries like China need to be considered. Companies may need to invest in greater data capacity, and the sustainability perspective should also be evaluated, particularly about whether such

developments align with the company's broader CSR (corporate social responsibility) strategy.

As the survey results show, most shipowners, brokers, and charterers are not yet at this stage to pursue this strategy, and therefore, this is not the recommended option. However, depending on how the market and technology develop, it could be an option to adopt this strategy in a few years.

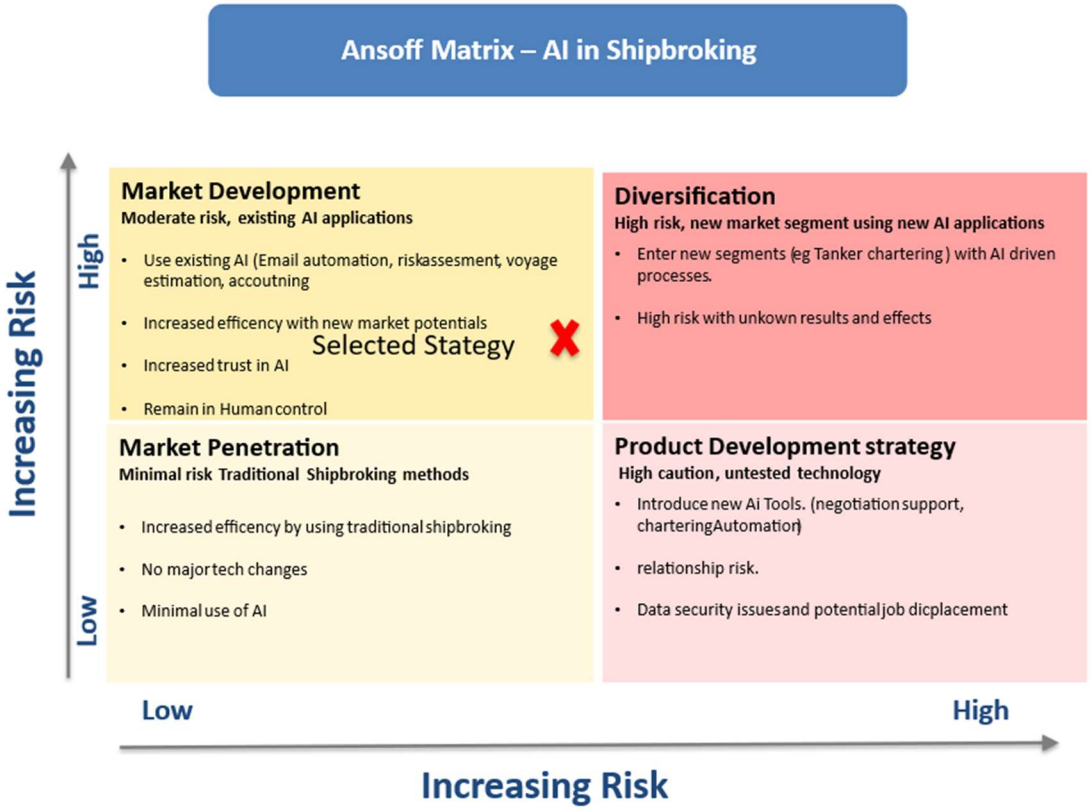

Figure 14 The Ansoff Matrix showing the strategies; Market penetration, Diversification, Market development & Product development strategies. Authors design 1st of May 2025

Finally, due to its flexibility and moderate risk, the "Market Development strategy" is believed to be the most practical and sustainable strategy of the four created in the "Ansoff Matrix" and, therefore, the best option.

CONCLUSION

In conclusion, the main objective of the paper, “How may AI affect the business microenvironment within the dry-bulk coaster sector in the coming years, and what strategy may shipbrokers select to best take advantage of this application in the macro business environment?”

AI refers to technologies capable of performing tasks that require human-like intelligence. In coaster dry-bulk shipping, AI is currently used in repetitive, data-driven areas such as voyage planning, forecasting, accounting, and email/document processing. Moreover, the survey results indicate that AI adoption remains limited. While interest grows, current usage is experimental primarily or focused on administrative support functions.

Out of the four strategies (Market penetration, Market development, Product development, and Diversification), the ***“Market development”*** is believed to be the best strategy in general for shipbrokers to adopt in the near future and gives a balance between risk and gains. Also dependent on the size of the corporation.

Further analysis could be done on the mapping of current AI usage within the dry cargo shipping sector to understand how technological maturity varies among brokers, shipowners, and charterers, and could provide valuable input for more tailored digital strategies. Additionally, tracking technological and regulatory progress, as well as industry market developments, needs to continue over time to determine whether higher-risk strategies, such as “product development,” may become more viable.

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APPENDIX 1

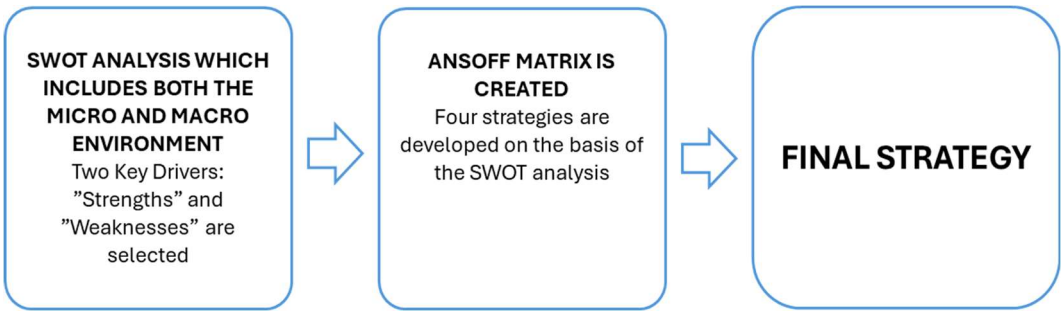

Figure 1: Showing paper structure and methodology. Authors design 1st May 2025

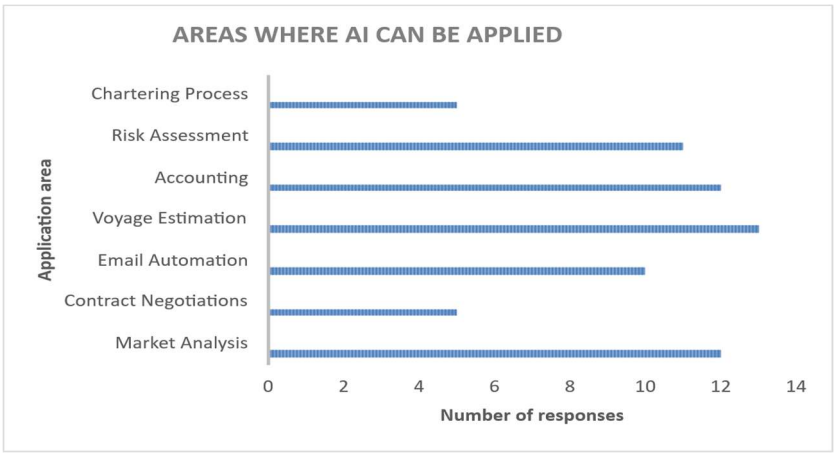

Figure 2 shows interviewees response to question number one in the questionnaire. Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström

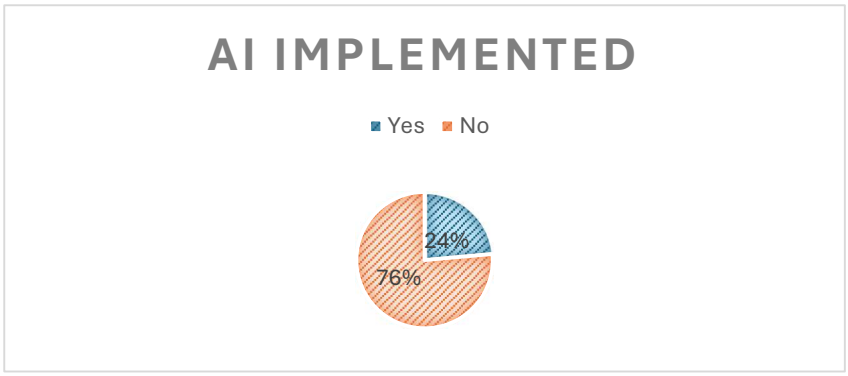

Figure 3 shows how many of the interviewees have implemented AI in their daily business routines. Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström

APPENDIX 2

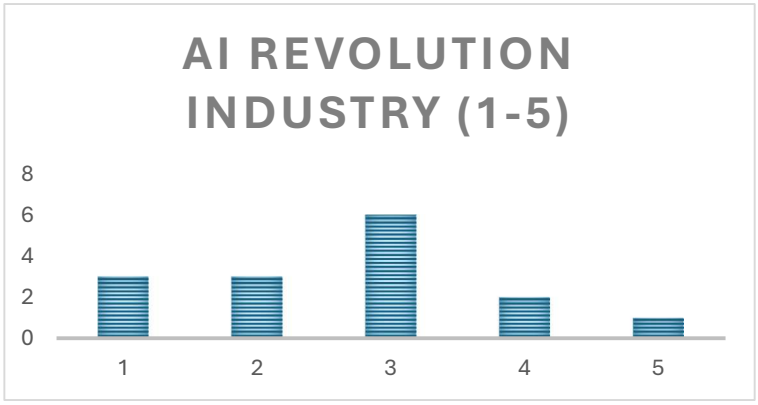

Figure 4 indicates the belief in the AI revolution held by the interviewees. 1 Strongly Disagree to 2 Strongly Agree) Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström

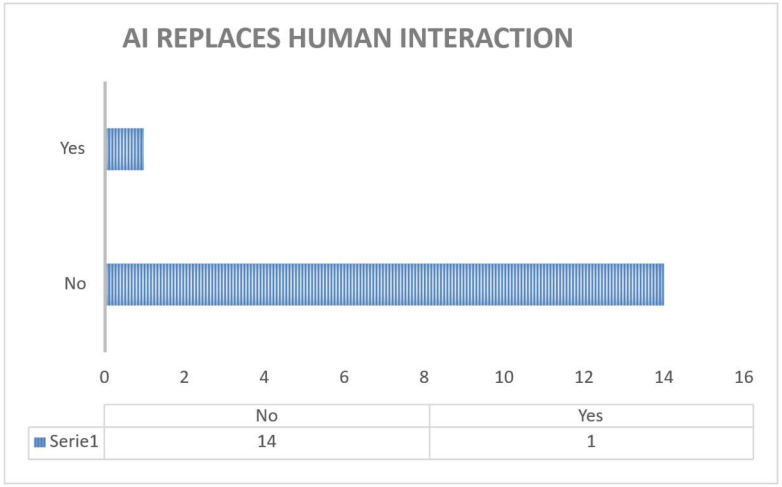

Figure 5 illustrates that only one interviewee out of 15 participating in the survey thought that AI would replace human interaction. Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström

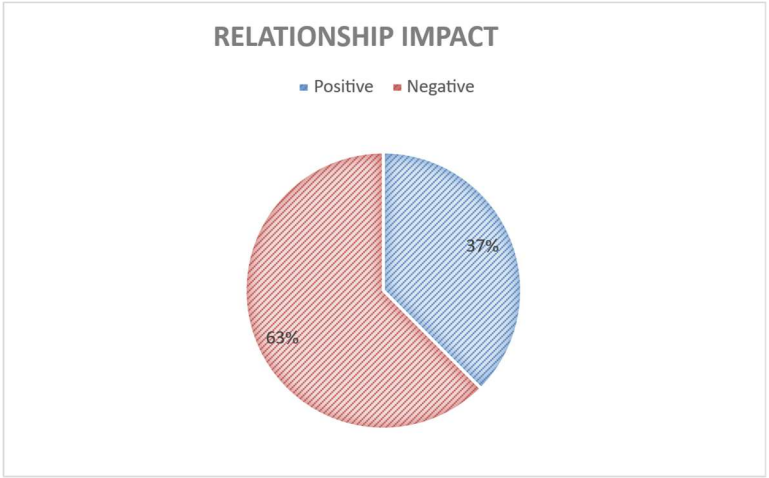

Figure 6 shows how interviewees thought AI may impact personal relationships. Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström

APPENDIX 3

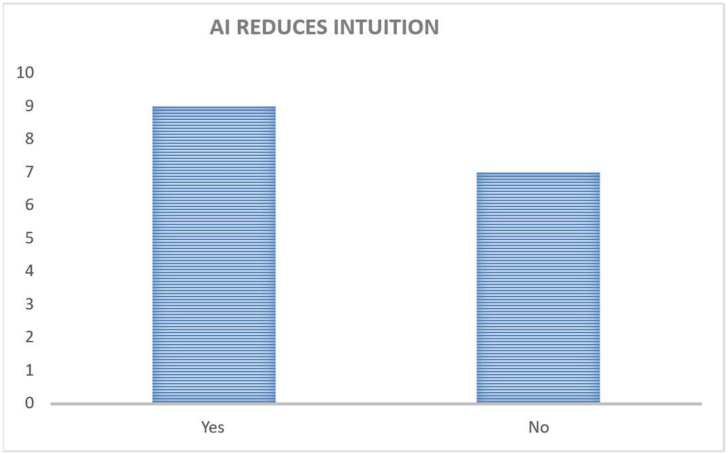

Figure 7 shows that a majority of the respondents of the survey were of the opinion that AI applications reduce human intuition. Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström

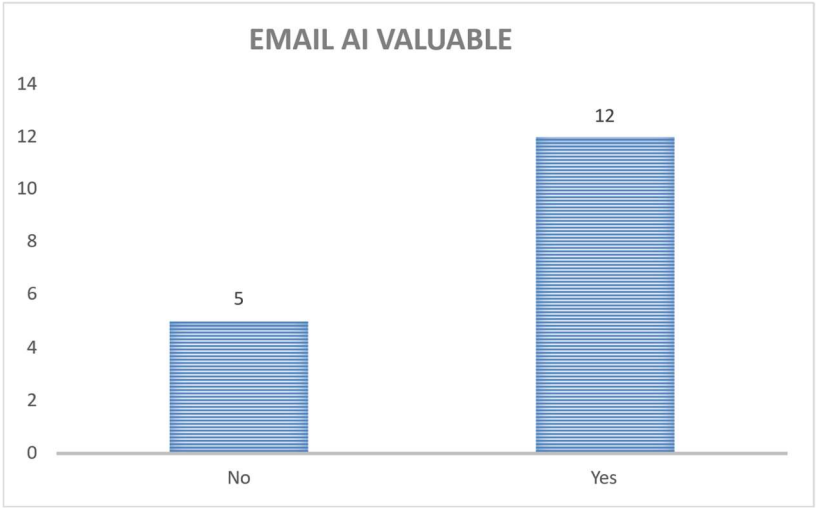

Figure 8 shows that the majority of the interviewees in the FONASBA questionnaire thought that AI optimization of email may be valuable. Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström

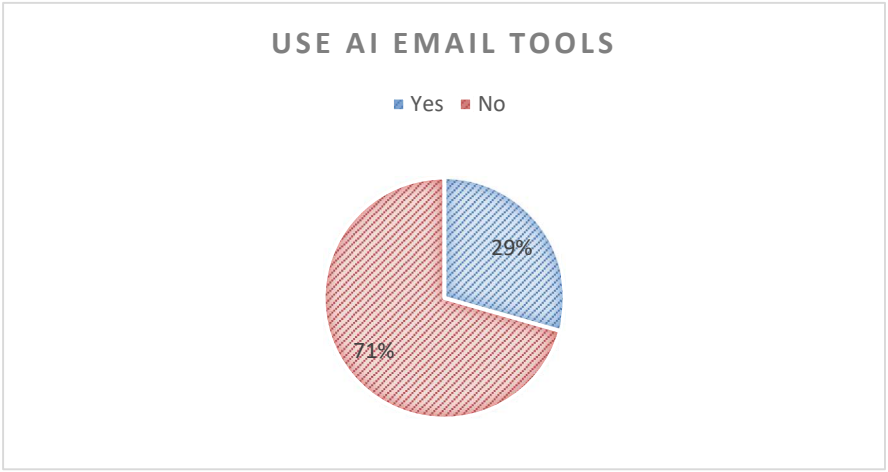

Figure 9 shows how many of the interviewees were using AI tools in their daily work environment. Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström

APPENDIX 4

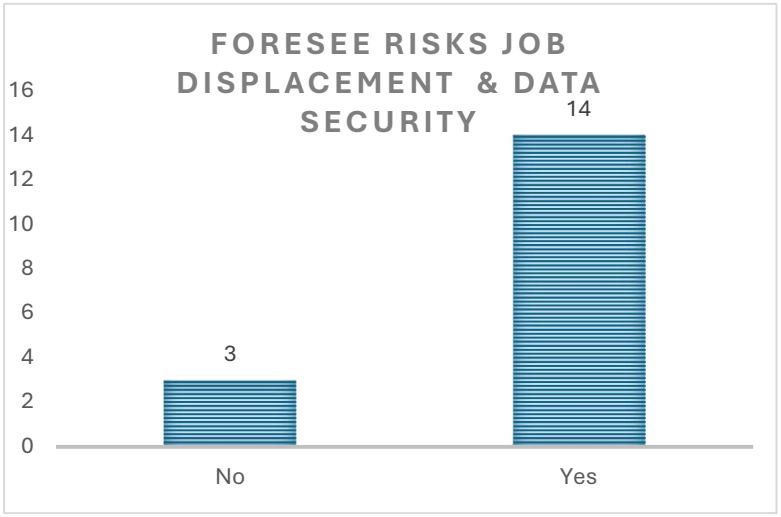

Figure 10: Showing how the survey respondents see the risk of job displacement & data security. Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström

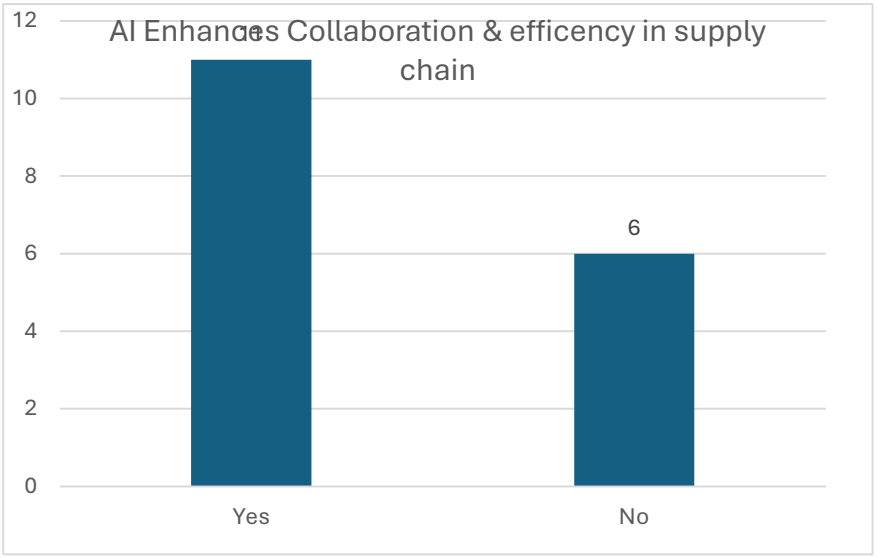

Figure 11 shows how interviewees thought about AI enhancing the overall supply chain. Authors design 1st May, 2025. Source: FONASBA Questionnaire by Otto Hillerstr

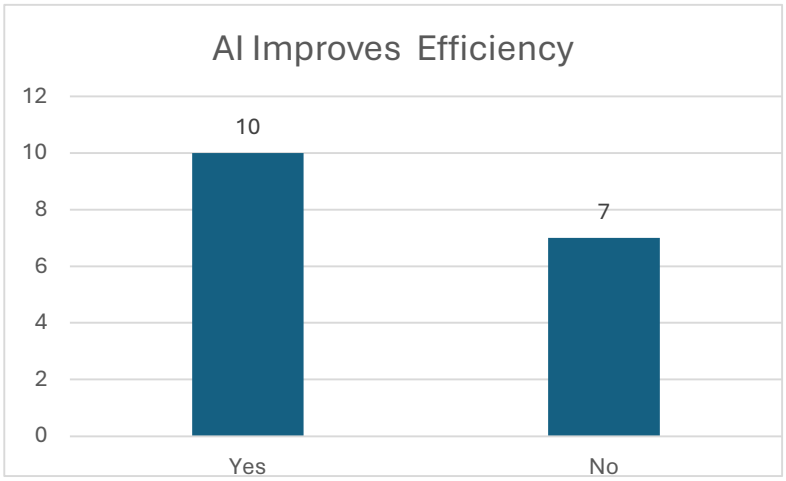

Figure 12 shows whether respondents believe AI will improve the efficiency of the negotiation process or not. Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström

APPENDIX 5

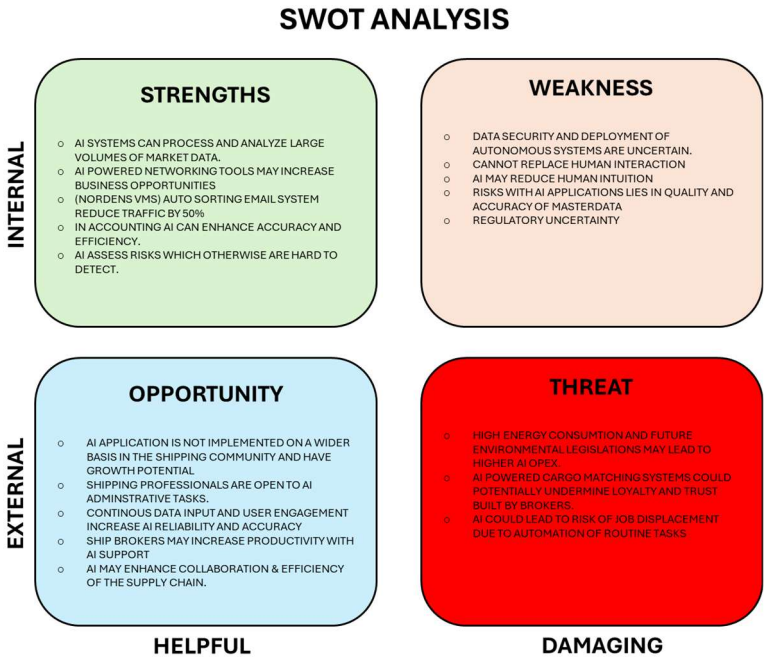

Figure 13 SWOT analysis showing AI applications: Strengths, Weaknesses, Opportunities & Threats. Authors design 1st May 2025

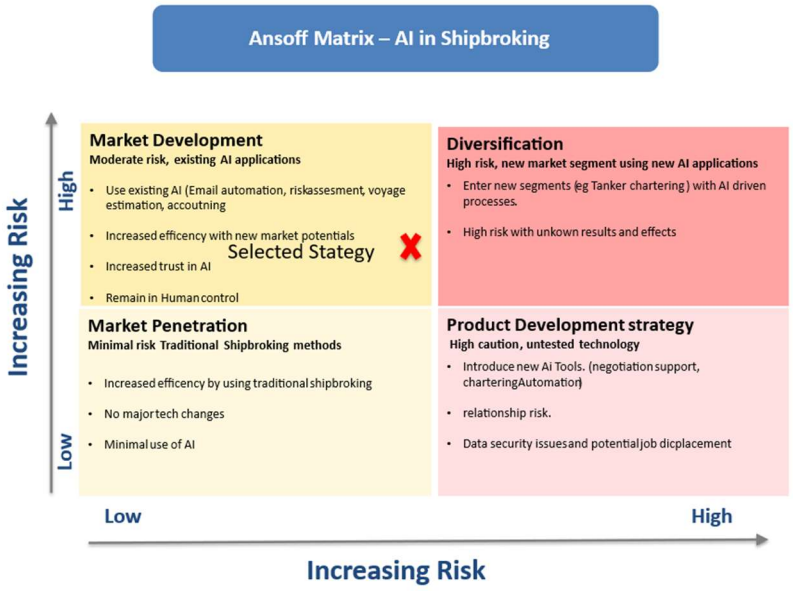

Figure 14 The Ansoff Matrix showing the strategies: Market penetration, Diversification, Market development & Product development strategies. Authors design 1st of May 2025

APPENDIX 6

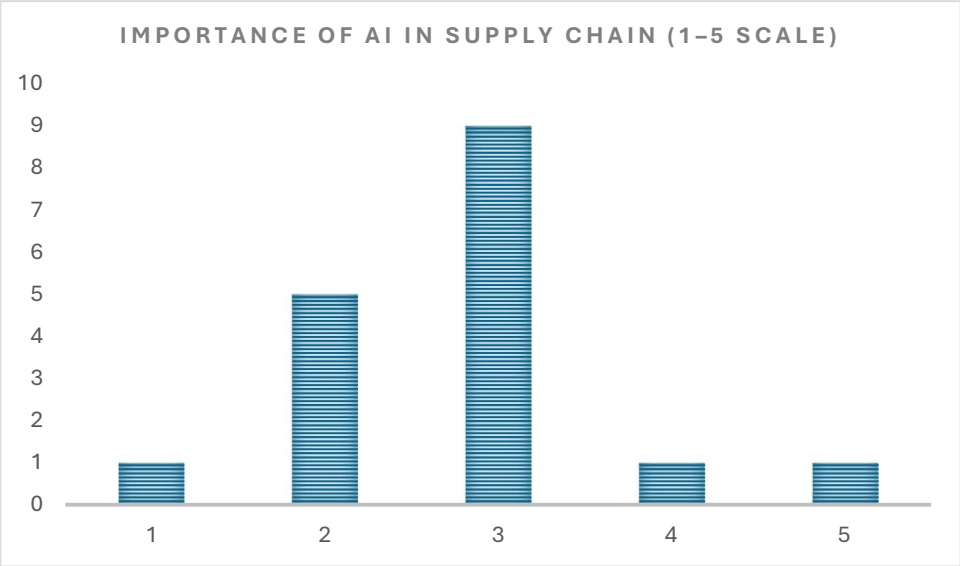

Figure 15 showing the importance of AI improvement in supply chain. Scale of (1 to 5) for the supply chain involving Shipbrokers, Shipowners & Charterers (1 being not at all, 5 being extensive); From Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström. Not part of paper.

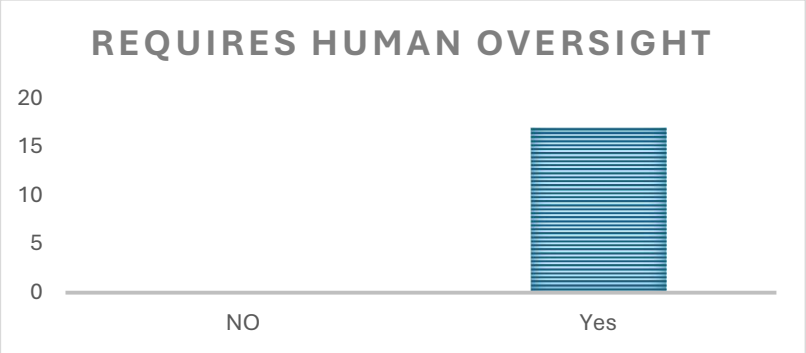

Figure 16. AI requires human oversight; From the Authors design 1st May 2025. Source: FONASBA Questionnaire by Otto Hillerström. Not part of the paper.

APPENDIX 7

Questionnaire

Artificial Intelligence (AI) refers to the capability of computer systems to perform tasks that typically require human intelligence. These tasks include learning from executing different task and improving its results. Analysing vast amount of data using algorithms to generate references and summary

1: Familiarity and Usage of AI

1. In which of the below areas of the commercial dry-bulk shipping business do you think AI can be applied?

☐Market analysis and forecasting
☐Contract negotiations[1]
☐Email automation [2]
☐Voyage estimation[3]
☐Accounting[4]
☐Risk assessment[5]
☐Chartering process automation[6]
☐Other (please specify) _____

2. Have you or your company implemented AI-driven tools in your daily operations?
   ☐Yes
   ☐No
   IF yes please advice if any of above _____

2: AI and the negotiation & operational process

1. In the future commercial coaster dry bulk shipping segment, how important do you think AI-analytics and predictive models will be on a scale of (1 to 5) for the supply chain involving Shipbrokers, Shipowners & Charterers (1 being not at all, 5 being extensively):

   ☐1
   ☐2
   ☐3
   ☐4
   ☐5

2. Do you believe AI systems should require human oversight at various stages of decision-making?
   ☐Yes
   ☐No

---

[1] *such as avoiding and repeating past mistakes from previous COA negotiations*
[2] *Email sorting, automated responses etc. in Microsoft Outlook or similar platforms*
[3] *Such as integrating realtime data (ship to office), scenario planning, applying historical data for better decision making etc. into the voyage estimate.*
[4] *Such as automatic filing of recaps and charterparties which subsequently are used for invoicing purposes and finally passed on to auditing and book-keeping.*
[5] *Such as finding right cargo description and C/P clauses when transporting dangerous goods, evaluating war risk zones etc.*
[6] *Such as linking all "SMS", "Whatsup", documentation and email traffic to the final recap, thereby reducing the risk of human error.*

3: AI´s Role in personal relations & experience

1. Since AI 's role is basically to reduce human error, improve time management, and refine the overall fixture process, in this respect, what impact do you think it will have on personal relationships between brokers, charterers, and shipowners?
   ☐Positive
   ☐Negative
   Personal comments _____

2. Could AI potentially reduce human intuition during negotiations and thereby making the commercial player more indifferent to the outcome of the process?
   ☐Yes
   ☐No

3. In an industry which highly rely on trust and personal relationships, do you think that AI can replace this element of human interaction?
   ☐Yes
   ☐No
   Personal comments _____

4: AI Optimization of Email Platforms

1. Would you consider AI-driven email optimization a valuable tool for managing communication in your daily shipping activities?
   ☐Yes
   ☐No
2. Do you currently use email functions with AI-features (email sorting, automated responses etc.) in Microsoft Outlook or similar platforms?
   ☐Yes
   ☐No

5: Future of AI in Dry Bulk Shipbroking

1. Do you foresee any risks such as job displacement and data security issues in implementing AI in commercial shipping business?
   ☐Yes
   ☐No
   Personal comments _____

2. To what extent do you agree with the statement: "AI will revolutionize the shipbroking industry within the next decade"? (1- Strongly Disagree, 5 - Strongly Agree)

   ☐1
   ☐2
   ☐3
   ☐4
   ☐5

3. Do you think AI can enhance collaboration and efficiency in the supply chain between Shipbrokers, Charterers, and Owners?
   ☐Yes
   ☐No
   Personal comments _____

Section 6: In summary

1. Taking the abovementioned into account do you believe AI will improve the overall efficiency of the negotiation process in shipbroking?
   ☐Yes
   ☐No
   Personal comments _____

Thank you for completing this survey. Please note you will remain anonymous

With kind regards: Otto Hillerström

SHIP AGENT: A JOB FOR WOMEN? CHALLENGES AND OPPORTUNITIES FOR WOMEN IN THE SHIP AGENCY FIELD

PAMELA GODGNIG

ITALY

2025

SHIP AGENT: A JOB FOR WOMEN?

CHALLENGES AND OPPORTUNITIES FOR WOMEN IN THE SHIP AGENCY FIELD

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INTRODUCTION

This paper aims to give a perspective on the ship agent job, from a female point of view: what it is to be a female ship agent? How many women are there boarding ships for a living? What are the challenges and the opportunities for women who intend to pursue this career? Do women add value to businesses and teams? Why should a student choose this among other jobs in the same or other industries?

I will try to answer these questions, as well as inspire women to join this exciting world.

CONTEXTUAL BACKGROUND

The maritime industry spans a vast array of sectors: first, we have the ship owners with their fleet. Then we have a wide range of services and actors that serve these ship-owners and these fleets: we find ship and crew management to operate the ship; port operations and services, operating in every single port to dock the ship and handle the cargo; maritime organization, port authorities, and port state controls, to perform their surveillance duty. Surveyors, P&I correspondents, shipyards, bunker services, legal, training, and many more.

In this context, we find the Ship agent and Ship broker figures. There is no secondary figure.

The Ship broker connects the ship to the cargo and makes it all happen.

The Ship agent, on the other hand, connects every single actor of the industry and makes the port call possible. It represents the ship owner in the port of call and acts on his behalf.

The Ship agent is responsible for *everything* during the ship's port call: it arranges the berth, it coordinates the berthing manoeuvre with the port services, it deals with all the authorities according to the local laws, it connects communication from the ship to the terminal, receives or delivers cargo, it is in charge of ship clearance for arrival and departure, it prepares and pass all documents related to the call.

But not only. It arranges anything else: provisions, bunkering, crew change, damage reports and handling, transportation, emergencies such as injuries or illness, and claims.

It counsels his principal based on his local experience and really is his man (or in this case, woman) in the port.

Maritime industry, including ship agency and ship brokering and chartering, is historically male dominated.

If we analyse the reason of this, we will find the following answers:

- Jobs in the maritime industry are historically considered to be hard for women, as male strength is thought to be required
- Women culturally tend to choose educational paths in arts, humanities, literature rather than STEM or technical disciplines. This usually closes the door to technical careers

- Being the industry male dominated, this can result in women being discouraged in choosing it

In the recent past, we have seen a slight change in the scenario described above.

With the advent of technology, strength is lesser and lesser required in the maritime industry.

More women are starting to choose technical disciplines, and as women start to populate the industry, this draws more awareness, more action, and, in the end, more women.

DIARY OF A FEMALE SHIP AGENT

Arrival clearance on board M/T Medalta Adventurer in 2025

Image 1 source: Pamela Godnig

I started my career as a ship agent in 2005, a few months after graduating as a deck cadet from nautical school “Istituto Tecnico Nautico Tomaso di Savoia” in Trieste, Italy.

I was one of the very few girls graduating every year from the Institute.

I first searched for a job to pay for STCW basic training and found a job with a local ship agent.

In 2005 Trieste was the Italian destination of the “sea highway” connecting Italy to Turkey, and I found job with Samer&Co. Shipping SpA, the general agent of UND RoRo, owner of the ferries that run on the line. In 20 years, the owner changed a few times, the line developed exponentially, as did Trieste port and its intermodal infrastructures. Today Trieste is one of the main ports not only in Italy, but in Europe.

In this environment I moved my first steps as a ship agent. There were not only ferries but all kind of ships and commodities: heavy lifting, crude oil, chemicals, metals.

I vividly remember how it was to board vessels at the beginning of my career: I would show up, a 20 years old girl with long blonde hair and green eyes. The captains would often look at me and roll their eyes as to say “who the hell did they send to me?”

But as soon as I started to unfold the papers on the desk and started dealing with authorities and port services, I could see the change in attitude, and I could feel they trusted me.

In Italy the Ship agent role is regulated under the law 135/1977, in which are defined the Ship agent’s role, requirements, and responsibilities.

One of these requirements is that the person that wishes to act as ship agent (in Italian *raccomandatario marittimo*) has to undergo and pass an exam and be listed as ship agent in the Chamber of Commerce of the port he/she wishes to operate.

I took and passed this exam in 2022 - while working full time, with a 2 year old and pregnant with the second.

It took hard work, strong will, and a real passion; today I manage the Cruise and Tramp traffic of Samer & Co. Shipping SpA - Ship Agency Business Unit.

Did I ever feel uncomfortable performing my job as a woman?

I didn’t. I have never encountered obstructions from my employer or peers. Quite the opposite: everybody was expecting I would act exactly like a man, and most of the times, I did.

I have never encountered problems with any other actor of the cluster either: as long as I prove to be professional, every captain, officer, owner representative, inspector and so on, would trust me.

Did I ever experience sexual harassment?

Not a single time. Maybe sometimes I would have experienced it if I had given it space. Key to work in a male environment is to always be friendly but always be very clear on setting your boundaries.

Did I ever feel unsafe performing my job as a woman?

I have never felt unsafe in port or ship areas. Sometimes I have felt unsafe working very late at night, when coming back home. But this can be experienced by women working late hours in any other field.

DATA ON WOMEN IN THE INDUSTRY

When I started to gather data on women in maritime industry, I realized there were not plenty. Moreover, there were no data regarding women solely in the ship agency business.

The biggest source of data for this paper comes from the 2024 IMO-WISTA Women in Maritime Survey, which luckily came out just as of the writing of this paper.

For this survey, data from companies within the maritime industry**,** and, separately, from IMO Member States' maritime authorities was gathered during the course of 2024 by Wista Association and IMO together. This is the second survey of this type made by IMO-Wista, the first time was in 2021, and a third one is expected to be carried out in 2027.

I'm not going to compare the two in this paper, as in the 2024 survey it is stated clearly that the two surveys are not an exact overlap, as only a small subset of 40 companies provided data for both surveys.

Moreover, in 2021, 513 companies participated in the survey, while in 2024, 608 participated.

I can only report that data is, unfortunately, downward, with a share of women employees by sub-sector of 29% in 2021, and 16% in 2024. Although we are not going to analyse this shift in this paper, it is stated to be probably due to data collecting reasons rather than reasons connected to the real picture.

The survey is covering both the public sector of member states' maritime authorities and the industry sector, but for the purpose of this paper, we are only analysing the industry survey, as we are after the numbers of our sectors "Ship agents" and "Ship brokers and charterers".

INDUSTRY SURVEY ANALYSIS

Within the industry survey, 608 completed responses were recorded from all over the World.

The largest single category of the segments in which the respondents operate, is set as "other", followed by port operations and services, and shipowners.

If we analyse by sub-sector, we find that the largest respondent "other" employees 20% of women, port operations and services only 13% while ship owner employ even less, with a share of 12%.

Image 2 source: Women in Maritime Survey 2024

Respondents span a vast array of other frontline operational sectors: cruise, bunkering, environmental technologies, and the workboat industries, including offshore, towage, and dredging.

Overall, the share of women employees is 16%.

The ship agent sector is above the average with 43% of women employees, based on the records of 24 respondents, while Ship brokers and charterers have a figure of 38% based on the records of 18 respondents.

If we were to make a rank for female employment in the industry, we would find maritime associations and recruiters in the first position with a female workforce of 70%, followed by ESG and decarbonization services, NVOCC/box operators, crewing agencies, and medical services.

Ship agency industry scores in 11th position, while Ship brokers and charterers 13th.

It is very important to have a clearer picture of the situation, to look at the distribution of the ranks that women hold in all sectors. With no surprise, we find that 30% of these women within the surveyed companies work in administrative and support roles, and only a share of 20% in mid-management and technical roles.

Below is the share by sub-sector:

Image 3 source: Women in Maritime Survey 2024

Image 4 source: Women in Maritime Survey 2024

Let's analyse our category, Ship agents and Ship brokers, and charterers:

In the Ship agent field, we see that women make up 48% of the supporting roles workforce, 27% of mid-management, and 44% of core roles.

If we analyse the Ship brokers and charterers, the figures are actually quite different, with 10% of the supporting roles workforce, 40% of mid-management, and the same 44% of core roles as ship agents.

The sector with the highest percentage of women employed in core roles is environmental technologies, with 84% of women employed in such roles, while the lowest is offshore and ship registries, with only 1% of women employed in such roles.

Some sectors have no representation whatsoever of women in core roles, such as ESG and decarbonization services (which, although it boasts 100% of women in mid management), fishing, and weather intelligence services.

Lastly, it is very interesting to analyse where these women are employed regionally:

Region	Total number of employees in the private maritime sector (men + women)*	Total number of women employed in the private maritime sector	Percentage of women employed in the private maritime sector
Africa	9,151	923	10.09%
Arab states and Mediterranean region	22,220	1,062	4.78%
Asia	34,755	5,748	16.54%
Caribbean	311	197	63.34%
Eastern Europe	139	66	47.48%
Europe	71,402	15,411	21.58%
Latin America	15,404	2,989	19.40%
North America	18,108	1,191	6.58%
Pacific	1,201	405	33.72%
Grand Total	172,691	27,992	16.21%

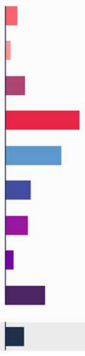

Image 5 source: Women in Maritime Survey 2024

OPPORTUNITIES AND CHALLENGES FOR WOMEN

Working in a male-dominated environment can be challenging, as well as surprisingly, present some great opportunities, especially nowadays.

I will list first the challenges, so that I leave you with the positive vibes of the opportunities in the end.

CHALLENGES

Commitment: working as a port agent is not a 9-to-5 job. It requires availability, most of the time 24/7, flexibility, and sacrifice. This can be particularly challenging if you are a woman, and even more if you have a family to take care of.

Gender bias and discrimination in the profession: Gender bias is the tendency to prefer one gender over another. It occurs when one individual attribute certain attitudes and stereotypes to another person or group of people.

Typically, gender bias refers to the preferential treatment given to men, and it describes the prejudice against women solely based on their sex.

Women may have to constantly prove they are just as capable as men in performing their jobs.

Gender roles**:** Gender bias often led to expectations that women should take on more "nurturing" roles, like organizing office events or taking notes in meetings, regardless of position.

Bias in Recruitment and Promotion: Women may face doubts about their capability or technical and leadership skills.

There can be a perception that women are “not tough enough” or that women disrupt team dynamics.

Lack of mentorship: Mentoring is often viewed from a hierarchical perspective, where a senior individual provides needed information to a mentee.

Fewer female role models can make it harder to see a clear career path.

Mentoring plays a key role in skills development, career advancement, success, and socioemotional support.

Cultural gender bias: shifting our attention away from the profession itself, being a working woman is much harder than being a working man. The reason for this is that women disproportionately shoulder the burden of home-related responsibilities. When there is a family involved, the situation for the woman is even worse, as women are culturally considered the primary caregivers for children as well.

This result is an enormous workload, and we see that very often women who decide to have a family have to choose between family and career.

This pattern varies from country to country, but it generally is deeply rooted in societal norms worldwide, and it continues to influence modern family structures and career choices for women.

OPPORTUNITIES

A great profession: working as a port agent is *fun*! Port agent does not have fixed working hours, and, despite the challenges listed above, this results in not having to sit in front of your computer all day or see the same faces every day.

You will have the chance to gain and improve specific skills such as real-time decision-making, organizational strength, crisis-handling abilities, logistics expertise, competence in maritime and port regulations, international trade law, customs regulations, maritime and port operations, and many more.

It can also open the doors to the maritime industry: if you haven't taken studies in a specific field, sometimes you can get there and get the job based on your experience.

Skill Recognition Over Bias**:** Male-dominated environments often emphasize performance. When you deliver results, you gain respect quickly.

Sometimes being in the minority can even play to your advantage and make you more visible. This, paired with competence and confidence, often leads to faster recognition and advancement.

Tough and Hostile Environments Build Reputation and Skills**:** Thriving in a tough environment shows grit.

It takes skills such as resilience, stamina, boundary setting, adaptability, confidence, problem solving, and self-control.

You will not only have the chance to learn them, but to practice them on a daily basis.

That builds a respected personal brand within your company and the industry, and in general, will turn you into a successful and mentally strong individual.

Image 6 source: M/V Queen Anne

Kelle Di Lazzaro, DPFSO of TTP, Captain Ingerd Klein Thorhauge, and Stefani Lito, executive assistant, during the plaque exchange for the maiden voyage of Queen Anne in Trieste

MIND THE GAP. WHY IS IT IMPORTANT?

There is ample evidence that investing in women is the most effective way to lift communities, companies, and even countries.

Countries with more gender equality are proven to be more prosperous:

The World Economic Forum has, since 2016, been tracking the progress of numerous countries' efforts towards closing the gap.

The Global Gender Gap Index annually benchmarks the current state and evolution of gender parity across four key dimensions (Economic Participation and Opportunity, Educational Attainment, Health and Survival, and Political Empowerment).

According to the Global Gender Gap Report 2023, the top nine countries are:

Iceland, Norway, Finland, New Zealand, Sweden, Germany, Nicaragua, Namibia, and Lithuania.

If we look at the Prosperity Index 2023 developed by the Legatum Institute, the top nine countries are:

Denmark, Sweden, Norway, Finland, Switzerland, the Netherlands, Luxembourg, Iceland, and Germany.

New Zealand ranked 10.

Companies with more women leaders perform better:

Companies with more women in leadership roles tend to perform better across several key metrics, including profitability, innovation, and employee satisfaction.

According to a 2020 McKinsey & Company report found that companies in the top quartile for gender diversity on executive teams were 25% more likely to have above-average profitability compared to those in the bottom quartile.

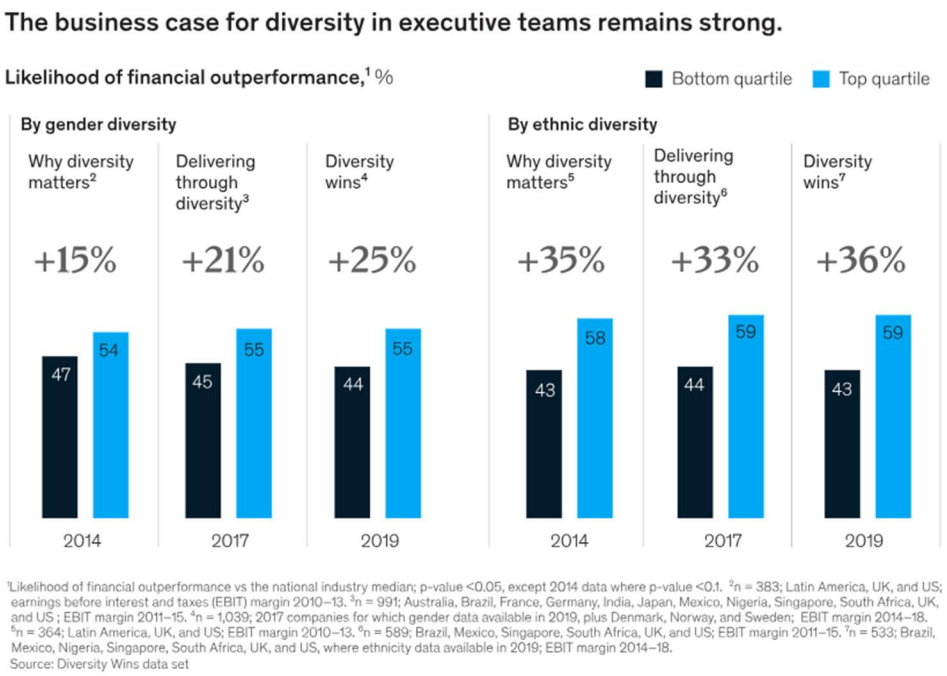

Image 7 source: McKinsey & Company, May 19, 2020 report "Diversity wins: how inclusion matters."

Gender-diverse teams make better business decisions up to 87% of the time, as stated in Cloverpop's paper titled "Hacking Diversity with Inclusive Decision-Making." This study analysed over 600 business decisions made by 200 teams across a range of companies. It found that inclusive teams—those diverse in gender, age, and geography—made better decisions up to 87% of the time.

If we are to focus only on gender, gender-diverse teams made better decisions 73% of the time, while all-male teams only 58%.

Team Composition	% Better Decisions	N	p-value
All-Male	58%	95	0.07
Overall	**66%**	**566**	-
20+ Year Age Range	72%	127	0.13
2+ Office Locations	72%	240	0.04
Gender Diverse*	73%	217	0.05
Geographically Diverse**	75%	117	0.04
Gender Diverse, 2+ Locations	79%	173	0.0005
Gender Diverse, 20+ Yr Age Range	80%	94	0.005
Gender, Geographically Diverse	87%	69	0.0002

Image 8 source: Clover pop research "Hacking Diversity with Inclusive Decision-Making."

Companies with more women in leadership also tend to have stronger environmental, social, and governance (ESG) profiles, which are increasingly linked to long-term success, McKinsey & Company has shown.

In their 2023 report “Diversity Matters Even More,” McKinsey analysed 1265 companies across 23 countries and highlighted that companies with greater gender and ethnic diversity in leadership not only outperformed financially but also demonstrated stronger social and environmental impacts, indicating a positive correlation between diverse leadership and ESG performance.

While McKinsey's reports establish a strong correlation between gender-diverse leadership and enhanced ESG outcomes, it's important to note that these findings are based on observed associations and do not necessarily imply direct causation.

These studies suggest that female leaders are more likely to prioritize long-term environmental sustainability over short-term gains and often place higher importance on climate-related risks and sustainable business practices.

We have, in fact, seen in our analysis on pages 6 and 7, that the ESG and decarbonisation industry employs a very high percentage of women, and ESG services have 100% of women employed in mid-management. This proves the strong link between these topics and the interests and results of women.

Companies with women in leadership usually promote broader diversity and inclusion policies while also tend to support initiatives related to work-life balance, fair labour practices, and community engagement.

Gender-diverse boards are linked to stronger corporate governance, reduced fraud, and better decision-making, and often have more transparent reporting practices.

Female leaders are often associated with inclusive workplace cultures, which can boost employee engagement and lower turnover.

GENDER DIVERSITY WITHIN SHIP AGENCIES

As we have discovered, gender diversity can significantly improve a company’s performance. Let’s see how this can be applied to our field:

Improved Decision-Making: Ship agencies coordinate complex logistics, liaise with diverse stakeholders (port authorities, customs, crews, shipping lines), and operate under tight time and budget constraints. Effective, timely decisions are critical.

Women may approach problems with different risk tolerances, communication styles, and collaborative approaches.

Diverse teams are less likely to fall into homogeneous thinking, resulting in better, more thoroughly vetted decisions, as we have seen in picture 8.

Women often bring high emotional intelligence, which improves negotiations and client relations—key for dispute resolution and stakeholder management in ports.

Enhanced Innovation: The shipping industry is undergoing transformation: digitization, sustainability demands, and changing global trade patterns require innovation in service delivery and technology.

Teams with gender diversity are more likely to generate a wider range of ideas, from tech solutions to workflow improvements.

Stronger Financial Performance: Efficiency, operational excellence, and customer retention are essential for profitability.

With more women in the team operation's efficiency could be boosted due to their well-known multitasking and organizational skills.

A diverse team reflects a broader customer base, increasing trust and satisfaction, and creating an overall better client relationship.

Diverse leadership tends to implement more inclusive and sustainable practices, which often lead to better resource allocation and team productivity, with efficiency gains.

Performing her ship agent duty on board M/Y Vive La Vie in Durres Port while pregnant in her 8th month. Image 9 source: Resi Misa

HOW TO FILL THE GAP

We've now seen why filling the gap is important, but how do we actually do it?

Let's have a look at what can actually be done to take more women to work in the ship agency and maritime field in general.

CULTURAL AND SOCIETAL SHIFTS

I put the cultural and societal shift first in the list, as in my opinion, it is the single most important yet probably the most challenging shift that must be made to fill the gender gap.

We can employ women, we can put them at the top of the corporate hierarchy, we can give them power, responsibility, and appreciation, but it doesn't work if we don't change the cultural environment around them.
There should be policies to cancel the cultural bias, or meanwhile to help women deal with it.

We need to change the concept of "maternity" into "parenthood**"**, something that can be done by both genders.

We need to create more paternity leave; in fact, we need equal paternity and maternity leave and make it normal in societies. The most advanced and prosperous societies already have this mindset.

We need to acknowledge that women work twice as much as men, if not more, due to their burden with home-related responsibilities and childcare.

We need to provide tools to lift the extra burden women are carrying, i.e., creating social benefits to pay for childcare and help with household tasks.

I would go as far as saying that working mothers should be paid more.

In fact, we have seen this in Italy with the law n. 213 dated 30/12/2023, which stated that all workers who were mother of 2 or more children aged 0-18 should be exempted to pay for social contribution. This amount has been covered by the Government not by the companies, and in the end, it resulted in more money for these mothers. Unfortunately, this was an experimental measure and ended on 31/12/2024, but in my opinion this was a great measure to foster both childbirths and working women and should be applied permanently.

EDUCATIONAL AND TRAINING INITIATIVES

In my opinion this is the second most important point, and very closely linked to the first one.

We need to get girls to choose technical institutes, STEM disciplines, fields related to maritime technology and engineering.

How can we employ more women if there are no women?

As I already mentioned, women culturally tend to choose educational paths in the arts, humanities, and literature.

Depending on country to country, generally, this is because society pushes them in this direction.

Look at small boys and girls playing. Boys usually play with trucks, balls, construction, and strong role models such as superheroes. Girls, on the other hand, sip tea with their dolls, chat, draw, and you can even see them with small strollers carrying dollies, while we don't see boys do that.

The result is that youngsters are growing up in a socially bias.

It is highly probable that a boy will choose an educational path in engineering, science, sport, and whatever else he has been playing with his whole childhood, knowing that the world expects him to act as some kind of superhero, therefore showing strength, authority, a strong will, and power.

A girl on the other side will probably choose something more suitable to her childhood environment, such as art, humanities, literature, and think that what is expected from her is to turn into a caring and nurturing beacon.

Families also encourage their daughters in this direction and sometimes clearly discourage studies or training in more technical fields, fearing this would lead to a potentially dangerous work environment or a lack of job possibilities due to their gender.

We need to change this from below, and I see that this is already happening: we need to talk to our children inclusively. We need to encourage girls to develop their technical side, as well as encourage boys to develop their artistic and emotional side.

And most importantly, children learn by example. Both boys and girls need to see working mothers, need to see their dads taking care of them, the house, the meals. They need to see caring fathers and practical mothers. This way, girls will learn that they can do that too. And boys will learn that household and childcare are not a female prerogative: they are common spaces and duties, and everybody must take care of them, regardless of their gender.

If we shift our spotlight to Institutes and Universities, they should promote STEM and technical studies among young female prospects, showing that these disciplines are not only for men.

This can be done using female role models and representatives in the promotion and using visual content that depicts both genders.

Image 10 source: Alessia Lonza, 2nd officer on board M/T Elisa in 2010

MENTORSHIP AND NETWORKING

As Institutes and Universities should promote STEM and technical studies to female prospects, we should do the same promotion in the industry: we need to show women that this industry is for them as well.

Not only are women suitable for this industry, but they are also *welcome*.

The maritime industry can promote itself using female role models and representatives, and use visual content that depicts both genders, but most importantly, we should do our part:

We all women in the industry should rise and show what it is to be a woman working in maritime. We should rise and talk about it: the good and the bad.

People need to know that there are women around here: men need to know, so it doesn't sound so strange, and women need to know, so that they can network, empower each other, and attract more women.

The biggest and most effective association of women in the industry is without any doubt Wista.

Established in 1974, Wista is the "Women's International Shipping and Trading Association", a global organization connecting female executives and decision-makers around the world. It connects more than 5100 female professionals from all sectors of the maritime industry worldwide.

It is present in 62 countries with the “National WISTA Associations”, whose mission is to provide regional networking, business and skill-building opportunities, corporate visibility, and also facilitate relationships within the industry.

I am a member myself of Wista Italy for only a few months, and since I joined, I have had the opportunity to take part in several events and already feel the benefit of being part of such a vibrant group of female professionals.

POLICY AND ORGANIZATIONAL STRATEGIES

When it comes to the work environment, inclusive practices should be respected, such as gender-neutral job descriptions, equal pay for both genders, a work environment free from stereotypes, harassment, and hostile behaviours, and inclusive infrastructure (i.e., ensure that there are enough facilities for women, even in spaces where there are mostly men).

To ensure that gender equality is respected, a tool such as a “gender equality certificate” can now be used.

A gender equality certificate is an official recognition awarded to companies that meet specific standards promoting equal treatment and opportunities for all genders. These certifications are usually granted by governmental bodies, non-governmental organizations (NGOs), or international institutions to encourage and verify efforts to reduce gender-based discrimination, close pay gaps, promote inclusive policies, and support diversity in leadership.

In Italy, the government has implemented the “Certificazione della Parità di Genere” (English for “gender equality certificate”), but similar programs can be found wordwide, i.e.

- EDGE Certification (Switzerland, global reach): A leading international certification for workplace gender equality.
- UN Women’s Empowerment Principles (WEPs): Not a certificate, but a globally recognized framework for companies.
- Australia's Workplace Gender Equality Agency (WGEA): Offers employer of choice citation for gender equality.

Since I live in Italy, I want to spend a few words on my experience with the Italian certification.

The Italian Gender Equality Certification System is regulated by specific national Laws (No. 162 of 5 November 2021 and by Law No. 234 of 30 December 2021) and is requested from businesses on a voluntary basis.

The certification process is available to companies of all sizes and is based on the gender equality practice UNI/PdR 125:2022, which defines the guidelines on the management system for gender equality.

The practice provides for the measurements, reporting and evaluation of gender data in organizations with the aim of bridging existing gaps as well as incorporating the new gender equality paradigm into the DNA of organizations and producing sustainable and lasting change over time.

To ensure a comprehensive measurement of the performance level, six strategic assessment areas are identified for different variables featuring an inclusive and gender-equal organisation: culture and strategy; governance; human resources (HR) management processes; opportunities for growth and inclusion of women in business; gender pay equity and parental protection and work-life balance.

The Company I work with has recently successfully obtained the Italian “Gender Equality Certification”, and since then I have noticed that they have been running campaigns of awareness, surveys on employee’s welfare focused on gender equality, parenthood and work-life balance, organized courses for employees on sensitive matters such as gender parity, stereotypes, maternity, respect, discrimination.

CONCLUSION

The Maritime Industry, including Ship Agent and Ship Brokering Field are male dominated, and it is not easy for women to access these careers or thrive in it.

This is due to a variety of reasons, mainly due to cultural gender bias and lack of societal policies that help women balance their work and family life.

It is a pity, because maritime careers are interesting, fun, well paid and absolutely suited for women. Moreover, it is shown that more women in the team and in the leadership boost companies' profiles in many ways.

Nonetheless, I think the era we are living in, is a great era for women: while women are working harder than ever, both outside and inside the house, there is lots of awareness on topics such gender equality and women empowerment.

Despite the difficulties, never like now there have been so many opportunities for women to disrupt and get their place in the male lines.

We have tools such ESG policies, Gender Equality Certification, organizations such Wista, to help them join, navigate and thrive in the maritime industry.

Governments, Institutions and companies should act in the direction of inclusion, while women should take the opportunity to jump on board, figuratively and literally!

I think *now* is a great moment to be a woman working in the maritime industry.

And you? What do you think?

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SMALL PORTS: THE VITAL ROLE IN GLOBAL TRADE NETWORKS

RICARDO LUIZ VON SÖHSTEN PEREIRA

BRAZIL

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INTRODUCTION

Port activities generate substantial economic benefits for countries by facilitating wealth transfer and creating employment opportunities. Maritime transport accounts for over 80% of the global volume of goods traded (UNCTAD). It serves as a critical link connecting continents, cultures, and populations, while also underpinning diplomatic and commercial relations between nations. As highlighted by Ban Ki-moon, former Secretary-General of the United Nations, maritime transport constitutes the backbone of global trade and the world economy (UN, 2016). Given these factors, the maritime sector demands rigorous and multidimensional analysis, particularly regarding the integration of small ports within this highly lucrative market.

In the context of the persistent expansion of international trade, the strategic roles of ports, especially smaller ones, are often underestimated. Large ports dominate the global maritime landscape due to their superior infrastructure, capacity to accommodate mega-vessels, and ability to manage high cargo throughput. However, smaller ports play a critical role in regional trade dynamics, frequently functioning as pivotal gateways for the distribution and aggregation of local and regional goods. Through these functions, they sustain vital links within the complex global trade network.

The significance of small ports extends beyond their immediate operational functions. They generate profound socioeconomic benefits for local communities. In countries where maritime cargo flows are heavily concentrated in a limited number of major ports, pronounced regional economic disparities may arise. Wealth and industrial activity tend to cluster around these hubs, as large corporations seek logistical efficiencies such as reduced inland transportation costs. While this concentration may yield short-term economic gains, it poses long-term risks to both regional economies and the broader global trade system. The overconcentration limits infrastructure diversification, leading to physical and operational bottlenecks that can diminish the efficiency and resilience of global supply chains.

Despite their comparatively modest scale and visibility, small ports are indispensable components of international supply chains. Their distributed presence enhances the flexibility and redundancy of maritime logistics networks. As global trade evolves in complexity, comprehending the contributions of small ports is essential for appreciating the full spectrum of interdependencies characterizing the international maritime system.

This study aims to elucidate the operational advantages and structural challenges faced by small ports, as well as to evaluate strategic approaches they may adopt to sustain competitiveness and relevance amid the rapid transformation of the global shipping industry.

PORT CLASSIFICATION

Port can be classified according to various criteria, depending on the purpose of the analysis (logistical, economic, geographic, or operational). Below is the classification based on infrastructure and Capacity.

Category	*Annual Cargo volume*	*TEU Throughput*	*Draft (Depth)*	*Example Ports*
Mega Port	*>100 million tons*	*> 10 million TEUs*	*> 15 meters*	*Shangai, Singapura, Rotterdam*
Large Port	*30-100 million tons*	*2-10 million TEUs*	*12-15 meters*	*Hamburg, Los Angeles*
Medium Port	*5-30 million tons*	*500.000-2 million TEUs*	*10 – 12 meters*	*La Havre, Santos*
Small Port	*< 5 million tons*	*< 500.000 TEUs*	*< 10 meters*	*Local and regional terminals Recife*

Table 1: Port Classification by Infrastructure and Capacity

TEU: Twenty-foot Equivalent Unit, a standard measure for container volume.

Draft: Refers to the water depth required to accommodate different ship sizes.

Cargo Volume: Includes both containerized and bulk cargo.

SHIP CLASSIFICATION

Ships can be classified according to cargo type, purpose, size, and area of navigation, among other factors. Below is the classification based on size.

Ship Class	***Deadweight Tonnage (DWT)***	***Typical Use***
Small Vessel	*Up to 10,000 DWT*	*Coastal trade, short-sea shipping, small ports*
Handsize	*10,000 – 40,000 DWT*	*Dry bulk cargo, general cargo, flexible port access*
Handymax / Supramax	*40,000 – 65,000 DWT*	*Bulk carriers for coal, grain, minerals*
Panamax	*Up to ~ 80.000 DWT*	*Max size for old Panama Canal (294 m X 32,3 m X 12 m)*
Post-Panamax	*80,000 – 120,000 DWT*	*Too large for old Panama locks, fit new locks*
Capesize	*120,000 – 200,000 DWT*	*Too large for canals; routes around Capes (horn, Good Hope)*
Very Large Crude Carrier (VLCC)	*200,000 – 320,000 DWT*	*Crude oil transportation*
Ultra Large Crude Carrier (ULCC)	*320,000 + DWT*	*Massive crude carriers, rare due to port limitations*
Malaccamax	*~300,000 DWT (max for Strait of Malacca)*	*Oil and Bulk routes Asia-Middle East*
Suezmax	*~160,000 DWT (max for Suez Canal)*	*Tankers optimized for Suez Canal dimensions*
Seawaymax	*~10,000 DWT (max forSaint Lawrence Seaway)*	*Great Lakes region*

Table 2: Ship Classification Based on Size

DWT (Deadweight Tonnage): The total weight a ship can carry, including cargo, fuel, crew, provisions, etc.

LOA (Length Overall): Total length of the ship.

Beam: Width of the ship at its widest point.

Draft: Vertical distance between the waterline and the bottom of the hull.

KEY CHARACTERISTICS FOR SMALL PORT COMPATIBILITY

- Shallow draft: Typically < 10 meters
- Short length overall (LOA): Preferably < 180 meters
- Good maneuverability
- Low height (air draft) for bridges and port cranes
- Low berth pressure: Lighter tonnage means lighter dock stress

For small ports, ships must have dimensions compatible with shallow draft, short quays, and limited infrastructure. Therefore, only smaller vessels are considered viable.

Vessel Type	Length (LOA)	Beam (Width)	Draft	Deadweight (DWT)	Typical Use
Small General Cargo Ship	60 – 120 m	10 – 18 m	4 – 6 m	2,000 – 10,000 tons	Transport of various goods (grain, wood, etc.)
Feeder Container Ship	80 – 130 m	15 – 22 m	5 – 6 m	up to 10,000 tons	Short-sea container transport
Mini Bulk Carrier	70 – 120 m	13 – 20 m	5 – 6 m	3,000 – 12,000 tons	Transport of dry bulk cargo
Coastal Tanker	70 – 130 m	12 – 20 m	4 – 6 m	3,000 – 8,000 tons	Transportation of liquid cargo (oil, chemicals)
Offshore Support Vessel (OSV)	60 – 90 m	14 – 20 m	3 – 5 m	1,000 – 6,000 tons	Offshore oil/ gas support
Small Passenger Ship/Yacht	30 – 150 m	8 – 20 m	3 – 6 m	Varies (lightweight)	Tourism, inter-island transport
Landing Craft	30 – 90 m	6 – 15 m	1.5 – 3.5 m	500 – 2,500 tons	Vehicles and cargo in shallow or undeveloped ports

Table 3: Classification focusing on ship sizes suitable for small ports

COMMON USE OF SMALL PORTS

- Island logistics
- Coastal trade / cabotage
- River or lake navigation
- Secondary ports or feeder routes

UNIQUE ADVANTAGES OF SMALLER PORTS

- Localized services.
- Flexibility.
- Ability to cater to niche markets.
- Benefits for the local population.
- Low occupancy rates.
- Enabling Specialized Operations.
- More affordable port tariffs.

The unique advantages inherent to smaller ports are frequently underappreciated, yet these facilities possess distinctive characteristics enabling them to fulfil specialized functions within the global maritime trade network. One of the most salient benefits is their strategic

geographic positioning. Small ports are often located in proximity to specific industrial clusters or agricultural production areas, enabling substantial reductions in both transportation costs and transit times. Such locational advantages are particularly critical for handling cargo types with stringent requirements, such as natural resources, perishables, or time-sensitive commodities, that demand rapid processing and minimal delay. This operational efficiency allows small ports to effectively serve specialized economic sectors, thereby reinforcing their integral role within regional supply chains.

Beyond locational advantages, smaller ports exhibit heightened operational flexibility and the capacity for personalized service delivery. Unlike larger, more standardized port complexes often constrained by rigid protocols and uniform procedures, smaller ports can swiftly adapt to the evolving logistical needs of shippers and consignees. Their ability to provide bespoke services tailored to client-specific demands not only optimizes operational performance but also fosters enduring business relationships. This client-centric approach appeals particularly to firms requiring more responsive, customized logistics solutions. Consequently, the provision of flexible, cost-effective, and timely services often confers a competitive advantage on smaller ports in markets where agility and customer service quality are paramount.

Additionally, smaller ports frequently demonstrate greater resilience in addressing unanticipated vessel contingencies, such as mechanical failures or regulatory inspections. These ports generally possess the capacity to accommodate vessels for necessary repairs or certification renewals without inducing significant disruption to the broader supply chain. Conversely, operational interruptions at major ports can propagate delays across interconnected global logistics networks, amplifying the systemic impact of such events.

Small ports also distinguish themselves through niche specialization. Many focus on handling specific cargo categories, such as bulk liquids, solid minerals, or other specialized commodities, investing in dedicated infrastructure and equipment tailored to their clientele’s unique requirements. This specialization not only enables the provision of services beyond the scope of larger, generalized ports but also cultivates a loyal customer base through reliable, expert handling of specialized shipments. The targeted nature of these operations drives repeat business from customers with complex logistical needs.

Certain cargo types characterized by relatively low volumes necessitate specialized logistical strategies to maintain economic viability in import/export operations. For such commodities, especially those with intermittent or fluctuating demand, smaller ports serve as critical nodes. Their capacity to offer less congested berthing schedules and reduced port congestion mitigates the risk of demurrage fees, charges imposed when vessels exceed their allotted port stay during loading or unloading. Utilizing smaller ports can therefore optimize operational cost structures for shippers handling low-frequency or volume-sensitive cargo.

The benefits of small ports extend beyond cargo handlers to include shipowners, charterers, and local communities. For instance, vessels arriving at final destination ports with expired certification may encounter difficulties in obtaining timely berth allocation, particularly at congested major hubs with limited inspection resources and competing priorities. This challenge is exacerbated during regional strikes or logistical bottlenecks, often forcing vessels to

anchor offshore, incurring costly delays and potentially jeopardizing the availability of critical raw materials for downstream production. In contrast, smaller ports, due to lower berth occupancy and reduced congestion, can often provide expedited access for certification renewal and vessel servicing, thereby minimizing operational downtime and facilitating smoother supply chain continuity.

Furthermore, the socio-economic impact of small ports on surrounding communities is significant. In many large nations, the concentration of cargo throughput at major ports can exacerbate regional economic disparities, as wealth and industrial activity become localized around these hubs, largely due to logistic advantages such as reduced inland freight costs. While such concentration may yield short-term gains, it risks long-term inefficiencies and structural constraints, including infrastructural bottlenecks that hinder overall supply chain performance. Small ports serve as critical counterbalances by promoting diversification within port infrastructure and enhancing logistical redundancy. This diversification helps alleviate congestion and infrastructure strain at major ports and provides a “relief valve” during transient demand surges.

An illustrative example occurred in Brazil in 2024, when a significant increase in sugar exports was observed. Adverse climatic conditions in India, the second-largest sugar producer and primary consumer, and a shift in Brazil’s export market toward Indonesia, the new largest importer surpassing China, created a surge in demand. Smaller Brazilian ports were instrumental in accommodating this spike. For instance, Recife Port handled 185,425 tons of bulk cargo in the first half of 2024 compared to 85,912 tons in the corresponding period in 2023. Bagged sugar throughput reached 136,697 tons by July 2024, up from 96,284 tons in 2023 (Recife Port Authorities). This case underscores the vital role smaller ports play in managing short-term fluctuations in global trade demand, thereby contributing to supply chain stability and resilience.

Image 1: Sugar operation at recife port. Source: Recife port website

In addition to easing operational burdens on major ports, small ports play a crucial role in supporting local economies and fostering community development. A noteworthy example is found in Pernambuco, Brazil, where the ports of Recife and Suape have actively contributed to regional growth not only through logistics operations but also via targeted social investments. In collaboration with port operators' unions, the *Formar Educational Initiative* was established to provide professional training for youth from socially vulnerable backgrounds. The program integrates both technical and socio-emotional skill development, aiming to prepare participants for entry into the labour market. This case exemplifies how ports can function as catalysts for social mobility, inclusion, and sustainable human development.

Furthermore, small ports substantially contribute to municipal revenues and the provision of public services. The port city of Antonina, located in the state of Paraná, Brazil, with a population of 18,223 (IBGE), offers a compelling illustration of this dynamic. According to the city's Department of Finance, in 2021 Antonina generated approximately USD 1.52 million in service tax revenue, of which the port sector alone accounted for USD 900,000. These funds are reinvested in critical public services such as education and healthcare, reinforcing the port's role in sustaining community welfare and improving quality of life.

Therefore, small ports should not be viewed merely as auxiliary components within national or global logistics systems. They represent strategic assets that enhance economic resilience, promote spatial equity, and generate inclusive development opportunities, elements that are increasingly essential in shaping a balanced and sustainable architecture for international trade.

Moreover, small ports frequently offer more competitive tariff structures than their larger counterparts. This cost advantage is particularly significant for businesses managing low-volume or niche shipments, for which reliance on larger, congested ports may not be economically viable. By offering lower port fees and reduced ancillary costs, smaller ports help minimize the overall logistics cost structure. This enables exporters and importers to enhance profitability or offer more competitive pricing in the market. Consequently, shippers can coordinate logistics operations in which a single vessel delivers goods to multiple regions or diverse recipients, thereby optimizing both cost efficiency and service reach.

CHALLENGES FACING SMALLER PORTS

- Sustainability
- Infrastructure challenges
- Cargo concentration in major ports

It is undeniable that small ports face significant challenges across multiple domains. These ports typically handle limited cargo volumes and, as a result, often fail to generate sufficient revenue to ensure financial self-sufficiency or to support necessary investments in critical operational and infrastructural areas.

PORT SUSTAINABILITY AND GEOGRAPHIC VULNERABILITIES

When evaluating the sustainability of port operations, geographic location emerges as a critical factor. Climate change, now widely acknowledged as a global phenomenon, has led to rising sea levels, one of its most alarming consequences. This trend poses a direct threat to coastal port cities, substantially increasing their vulnerability to flooding and other climate-related disruptions.

Some ports are situated in low-lying coastal areas, where the risk of submersion is especially pronounced. Notable examples include the Netherlands and Recife, the capital of Pernambuco state in northeastern Brazil. Both regions have developed strategic responses to confront these environmental challenges, leveraging their unique local characteristics to implement adaptive solutions.

In the Netherlands, where extensive land areas are exposed to the threat of sea-level rise, several initiatives have been launched, including the “Living with Water” project. This effort is centered on port-related research in the Dutch delta and is integrated into broader programs, such as “NXR 2024 – Designed for Extremes”, which aims to formulate strategies to mitigate the impacts of extreme climate conditions.

Within this broader context, the “Netherlands Exchange Recife Initiative” stands out as a successful example of international cooperation. This partnership between the Dutch and Brazilian governments fosters the exchange of knowledge, experiences, and technological

innovation, involving educational and research institutions from both countries. Pernambuco's participation is particularly significant, given its shared environmental vulnerabilities with the Netherlands. This collaboration demonstrates how, even in contexts of limited financial resources, joint efforts and technology integration can enhance the resilience and sustainability of port infrastructure.

COMMUNITY ENGAGEMENT AND ENVIRONMENTAL STEWARDSHIP

The port's influence on its surrounding urban environment can also serve as a catalyst for mutual cooperation in pursuit of sustainable development. Ports and local communities can jointly identify and implement cost-effective, practical solutions to promote environmental sustainability and socio-economic resilience.

An illustrative example can be found in initiatives led by the Port of Suape in Pernambuco. Along the coast near Suape, the "Hippocampus Institute", a non-profit organization dedicated to seahorse conservation, had been struggling due to limited funding. Recognizing the ecological value of the institute's work, Suape Port established a strategic partnership to support its ongoing efforts in marine biodiversity preservation.

As part of this collaboration, Suape Port mobilized regional businesses and local citizens to become stakeholders in the conservation process. These efforts resulted in a multi-faceted support framework that includes direct funding, sponsorships, and environmental education programs. One component of the agreement includes monthly meetings between port authorities and local fishers to raise awareness about the ecological importance of seahorses within the marine ecosystem.

In addition to these direct engagements, broader public outreach and fundraising campaigns were launched to involve the wider community. For instance, posters and donation boxes were installed along highways near the port facilities, enabling drivers and passersby to contribute to the environmental preservation efforts.

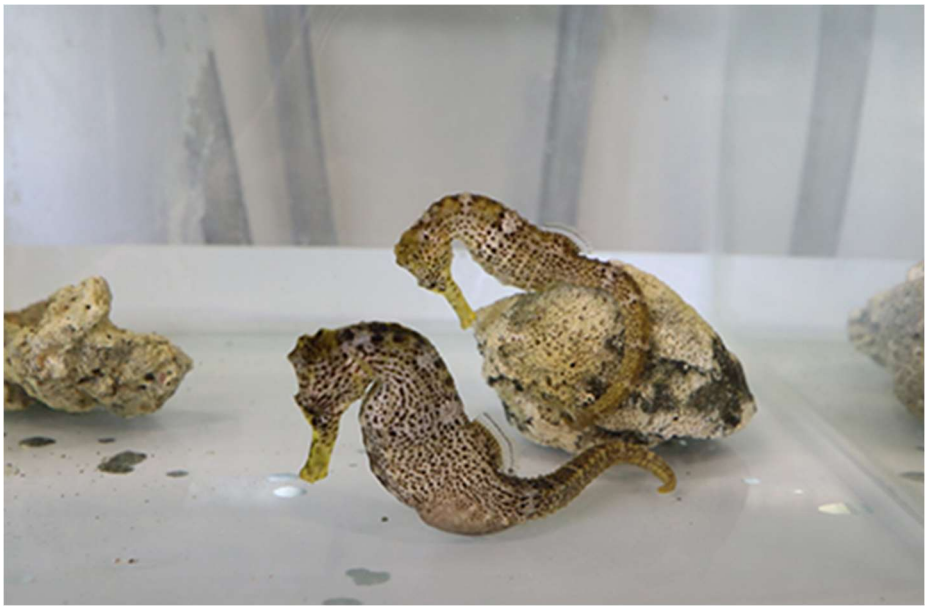

Image 2: Seahorse - hippocampus institute. Source: suape port website

Despite having more limited financial resources, the Port of Recife actively contributes to environmental preservation through strategic initiatives. For several years, the port has maintained partnerships with local universities to promote academic engagement in the maritime sector and foster the development of sustainable technologies.

Through these collaborations, university students have the opportunity to undertake internships at the port, where they work on practical, research-driven projects. These initiatives have already yielded positive outcomes. For example, some students have developed projects tailored to the port's unique environmental and operational context. One notable achievement is the creation of a prototype vessel powered by renewable energy. This vessel is equipped with sensors capable of monitoring key environmental parameters such as water and air quality within the port area.

Furthermore, the port has partnered with academic institutions to support hands-on educational experiences, such as through the "Ciência do Mar IV vessel", which serves as a floating laboratory. The Port of Recife provides docking facilities for the vessel, enabling students to conduct applied marine research and to develop technologies for monitoring marine ecosystems. This collaboration not only enhances scientific learning but also contributes to environmental stewardship efforts that benefit both the port and the broader community of Recife.

Image 3: ciência do mar iv vessel. S*ource: recife port website*

INFRASTRUCTURE CHALLENGES

One of the main infrastructure-related challenges faced by smaller ports is the lack of multimodal transport connectivity, such as railways and highways. These transport modes are essential extensions of port operations, enabling efficient cargo transfer between inland regions and port terminals. The absence of such infrastructure limits the logistical integration of small ports into broader trade networks.

Another critical issue is the need for regular dredging operations to increase the navigational draft. Without sufficient depth, these ports are unable to accommodate larger vessels or handle substantial cargo volumes, which restricts their competitiveness and operational efficiency.

Given these limitations, it becomes evident that active government involvement in the Brazilian logistics sector is essential, not only from an economic standpoint but also in terms of social inclusion and regional development. Stimulating the growth of underdeveloped regions would foster a more equitable and prosperous society, in line with the arguments of French economist Thomas Piketty, who asserts that “inequality is not a fate; it is the result of political and institutional choices.”

CARGO CONCENTRATION IN MAJOR PORTS

The maritime sector plays a vital role in driving economic activity, generating employment, and supporting the financial sustainability of port cities. In this context, competition among ports to attract cargo volumes and logistics companies is inevitable. However, without adequate oversight and planning, this dynamic can result in an excessive concentration of cargo flows in a few major ports.

A clear example of this phenomenon can be observed in Brazil, where the Port of Santos, located in the Southeast region, handles nearly 29% of the country's total trade volume equivalent to USD 165.8 billion, according to the Santos Port Authority.

Cargo originating from the Central-West region, known for its strong agribusiness sector, especially soybeans and corn, is frequently exported through southern and southeastern ports, despite these being farther than alternative ports in the North and Northeast. This is largely due to better infrastructure in those regions.

To counter this imbalance, the Brazilian government launched the "Arco Norte Project", a strategic initiative aimed at developing an integrated logistics network encompassing ports, highways, and railways in the North and Northeast regions. This project enables the export of agricultural commodities from the Central-West through smaller, regionally located ports, reducing transportation distances to major international markets and lowering maritime freight costs.

As a result, these smaller ports have gained increasing relevance. According to the Brazilian Confederation of Agriculture and Livestock (CNA), in the past year, ports within the Arco Norte corridor exported 55.1 million tons of soybeans and corn, representing 34.6% of total grain exports, compared to just 13% in 2008. Furthermore, Flávio Acatauassú, president of the Amazon Basin Port Terminals and Cargo Transshipment Association (Amport), suggests that with planned investments, Arco Norte ports could handle up to 50% of Brazil's agricultural exports.

These results underscore the potential of smaller ports when supported by targeted public policies and infrastructure development. Encouraging their use helps decentralize logistics, balance regional development, and enhance Brazil's competitiveness in the global market.

CABOTAGE SHIPPING: AN ECONOMIC AND ECOLOGICAL ALTERNATIVE

Cabotage, as defined by Brazilian Law No. 9,432/97 (Article 2, Item IX), refers to maritime navigation between domestic ports using sea routes or a combination of sea and inland waterways. It is a strategically important mode of transport in a country with over 7,300 km of coastline (Brazilian Navy).

Incentivized by Law No. 14,301 of January 7, 2022, cabotage in Brazil has seen notable growth. By 2024, it enabled a 20% increase in cargo movement via domestic shipping, according to the Ministry of Ports and Airports (MPor, 2024).

Despite the longer distances involved, cabotage remains significantly more sustainable than road transport. For example, transporting cargo from Porto Alegre (South) to Manaus (North) by road covers about 4,000 km, while the waterway route spans approximately 5,500 km. However, CO_2 emissions from road transport for this route are estimated at 464 kg per 1,000 TKU, whereas water transport emits only 110 kg, over 76% less. This underscores the environmental advantage of cabotage.

The multipurpose vessel Pio Grande is capable of replacing the function of approximately 715 combustion-powered cargo trucks, while emitting significantly lower amounts of carbon dioxide on round-trip routes.

Ships emit one-sixth of the greenhouse gases (GEE) produced by trucks when transporting equivalent cargo volumes.

Therefore, increasing the number and capacity of smaller ports enhances the feasibility of waterway transport, contributing to a more sustainable national logistics model.

In light of this, it can be inferred that the presence of multiple ports across different regions of the country, even small-scale ones, is of great environmental importance. Expanding port infrastructure increases the feasibility of using waterway transport, a modal option that is significantly more environmentally sustainable.

Figure 4: Proportion of gee gases emitted by a ship and by 715 trucks. Source: Author

TOURISM-DRIVEN PORT DEVELOPMENT

Many Brazilian ports are located in coastal cities with considerable natural beauty, making them ideal for tourism. According to the Cruise Lines International Association (CLIA), each tourist disembarking from a cruise ship spends an average of USD 106 locally. For example, the city of Maceió generated approximately USD 13.7 million during the most recent cruise season, as reported by local authorities.

Tourism can thus represent a significant revenue stream for both ports and their surrounding cities. However, realizing this potential requires proper infrastructure to accommodate cruise vessels. If such infrastructure is lacking, it is essential to secure investment, whether public or private, to develop facilities that meet the standards of the cruise industry.

MARITIME AGENTS AND SMALL PORTS

In line with the various benefits of small ports mentioned in the previous chapter, it is imperative to highlight one of the key players that makes all these positive impacts viable: the shipping agent.

The ship agent, according to the updated IMO FAL Convention, effective from 1 January 2018, sets out the following definition: “The party representing the ship’s owner and/or charterer (the principal) in port. If so instructed, the agent is responsible to the Principal for arranging, together with the port, a berth, all relevant port and husbandry services, tending to the requirements of the Master and crew, clearing the ship with the port and other authorities (including preparation and submission of appropriate documentation) along with releasing or receiving cargo on behalf of the Principal.”

Therefore, seeking the benefits for those he represents, he is a professional who possesses extensive technical knowledge of port operations and the bureaucratic processes specific to the region and port in which they operate, to secure comprehensive benefits for all stakeholders.

In this sense, the shipping agent serves as a hub of integrated knowledge, acting as a "catalyst" for the optimization of port activities. This is due to the fact that the agent holds crucial information for efficient logistics. For example, they possess in-depth technical knowledge regarding ships and cargo volumes that are compatible with a given port, taking into account all local technical restrictions. Additionally, they have access to a wide range of information about port tariffs and infrastructure, including berth occupancy across regional ports. This allows for more efficient vessel berthing, reducing the likelihood of extended wait times that could result in significant costs.

Moreover, the shipping agent establishes key connections between the ship’s master, the crew, and the entire local port ecosystem and also serves as a point of intersection to enable ship and port operations comply with environmental regulations.

Given all the points discussed, it is clear that the shipping agent is a highly important professional in the field of logistics. By working alongside their representatives, they are able to identify tailored solutions for each vessel and, above all, leverage the advantages offered by the country's various ports, including smaller ports, which also present numerous benefits.

FEDERATION OF MARITIME AGENTS AND SMALL PORTS

As previously discussed in this study, it is undeniable that small ports face numerous challenges, primarily due to their limited economic capacity when compared to major port complexes. Nevertheless, as demonstrated, small ports exhibit key characteristics that are vital both to the global economy and to the socio-economic development of the surrounding port communities.

Fostering Community Engagement: The integration of small ports with local businesses and industries represents a strategic opportunity to enhance their operational viability. Establishing cooperative relationships with regional producers and enterprises can ensure a consistent flow of goods and services, thereby maximizing the utilization of port infrastructure and reinforcing the port’s role in the local supply chain.

As in any productive sector, strategic alliances and geographic positioning are critical in stimulating economic activity and delivering tangible results. Ports are no exception. It is essential to establish commercial partnerships between private sector stakeholders and port authorities in order to attract investment and promote the continuous maintenance and modernization of port facilities.

Within this framework, certain actors play a particularly significant role due to their technical expertise and operational relevance. One such example is shipping agents, who, as previously noted, are fundamental to the efficient coordination and optimization of port operations.

This underscores the importance of trade unions and federations representing these professionals, as they act as institutional advocates, safeguarding the interests of their members. These entities can be instrumental not only in attracting investments but also in providing critical political and legislative representation.

In the legislative arena, the effective representation of shipping agents through their unions and federations is essential to ensuring that the specific concerns and demands of this professional group are acknowledged and addressed. Such advocacy may contribute to the implementation of policies that incentivize maritime transport and, either directly or indirectly, support the development and competitiveness of small ports.

CONCLUSION

In summary, although smaller ports may lack the capacity to handle the vast volumes of cargo processed by major global hubs, they offer substantial value to international trade through their strategic locations, operational flexibility, cost-effectiveness, and specialized services. These attributes enable smaller ports to carve out competitive niches that support local and regional economies. As a result, they remain vital players in an increasingly complex and dynamic maritime industry.

Despite the dominance of large ports in global shipping, smaller ports continue to play a critical role in trade networks. Responding effectively to contemporary challenges, such as the increasing size of vessels and shifting trade patterns, demands strategic planning, targeted investment, and continuous innovation. Maritime agents are instrumental in this process, providing expert coordination of vessel operations, facilitating compliance with international regulations, and optimizing port logistics. With their guidance, smaller ports can enhance operational efficiency, improve service delivery, and reinforce their relevance within the global shipping landscape.

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POLYCRISIS AND PERMACRISIS IN THE INTERNATIONAL SYSTEM REFLECTIONS ON THE MARITIME AGENT IN ENTROPIC CONTEXT

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ARGENTINA

2025

POLYCRISIS AND PERMACRISIS IN THE INTERNATIONAL SYSTEM REFLECTIONS ON THE MARITIME AGENT IN ENTROPIC CONTEXTS

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INTRODUCTION

A COMPLEX WORLD

In the last twenty-five years, the global international system and its subsystems (environmental, economic-financial, health, geopolitical, cultural, etc.) have presented a characteristic of their own as at no other time in history, the existence of numerous crises on a local scale (e.g., government crises within countries, civil wars, etc.), regional (war conflicts, trade tensions, etc.) and global (pandemic, environmental, economic, migratory problems, etc.) tending to concatenate, synchronize, accelerate and amplify, subsuming the entire international system and its individuals within the conceptual category of "polycrisis". According to Sanahuja (2024), global polycrisis is defined as the combination of crises in different interdependent global systems - environment, energy, food, health, economy, transport and supply chains, international security, and social order and governance-, whose causes are intertwined, which have cascade effects that extend to all these systems (spillover effect), and which together significantly degrade the choices and possibilities of humanity.

Added to this, the permanence and persistence of these entangled crises immerse us in a state called "permacrisis" (Castells, 2018), that is the duration of anomalous phenomena over time on different systems, and which are replicated within the various subsystems, as being the clear example of maritime transport, inserted within the world economic system. The summation of polycrisis + permacrisis results in disorder and chaos at every level, caused by the juxtaposition of actors and dynamics passed on to all activities, including the maritime agent, which I will call entropy. This conceptualization, which comes from physics but has been adopted in social theories (Schweller, 2016), determines how much disorder is in a system, the greater the disorder, the greater the entropy.

The aim of this work is not to attempt to address practical aspects of maritime agency (which were so well developed by the authors throughout the precedents YABA), but on the contrary, aims to focus on the philosophical and epistemological support to maritime agency in general and the ship agent in particular concerning the future of activity in a complex world based on the understanding of the systems in which it is immersed. Bearing in mind that many of the difficulties of the international system tend to be replicated within the activity and that, by chance, it is intrinsically related to maritime transport and its challenges. The fundamental feature of the universal figure of the maritime agent (which exists in all countries of the world) makes it irreplaceable for the functioning of the world maritime trade, because it determines everything from large-scale commercial management to nautical management at all levels of the customers. It clashes with the entropic disorder of today's world, which often interferes with its normal development and efficiency.

This complexity forces us to reflect on the performance of the maritime agent in an unpredictable and uncertain world. How does the ship's agent operate in such contexts? From the perspective of the maritime agent, how does it tackle disharmony situations such as environmental problems, geopolitical tensions, and the revolution of artificial intelligence that have a direct impact on maritime transport, port management, and ship management?

In the following chapters, I will briefly develop the basic concepts for understanding the current international system (polycrisis, permacrisis, and entropy), while we will then delve into the function of maritime agency as an activity and into the ship agent as an individual in a turbulent world.

POLYCRISIS, PERMACRISIS, AND ENTROPY: THREE CONCEPTS INTERTWINED

I start from the idea that the three concepts are interrelated in a way that makes it impossible to separate them from each other. If polycrisis is the theoretical core that allows us through the interdependence of successive and simultaneous crises to which are subjected the different subsystems of the international system explain in what world we live, permacrisis gives us the temporal notion of it and as causality of both manifests the degree of entropy to which the systems are subjected.

The idea of polycrisis owes its invention to complexity theorists Edgar Morin and Anne Brigitte Kern, who in the late 1990s, starting from a holistic approach to systems theory, identified the following crises:

a) The ecological crisis
b) The global crisis of development
c) The uncontrolled and blind development of technoscience
d) The rule of mechanistic and fragmented thinking
e) The population surge and
f) Global economic disorder, which includes issues ranging from disorder in the trade of raw materials to poor regulation of the enormous debt of developing countries (Morin & Kern, 1999).

According to Helleiner (2024: 2), “they also intend the term to refer to the fact that many of the crises and their effects have “inter- retroactions” and are “mutually implicative” in ways that “one is at a loss to single out a number one problem to which all others would be subordinated.”

Morin and Kern attribute this situation to continuous phenomena and long development in time ("long durée), not anticipating shocks and unforeseen situations. However, they were the starting point for other scholars like Tooze to delve deeper into thematics. Through its images of the crisis, the so-called "Krisenbilder" (Tooze,2022a) presents the following diagram:

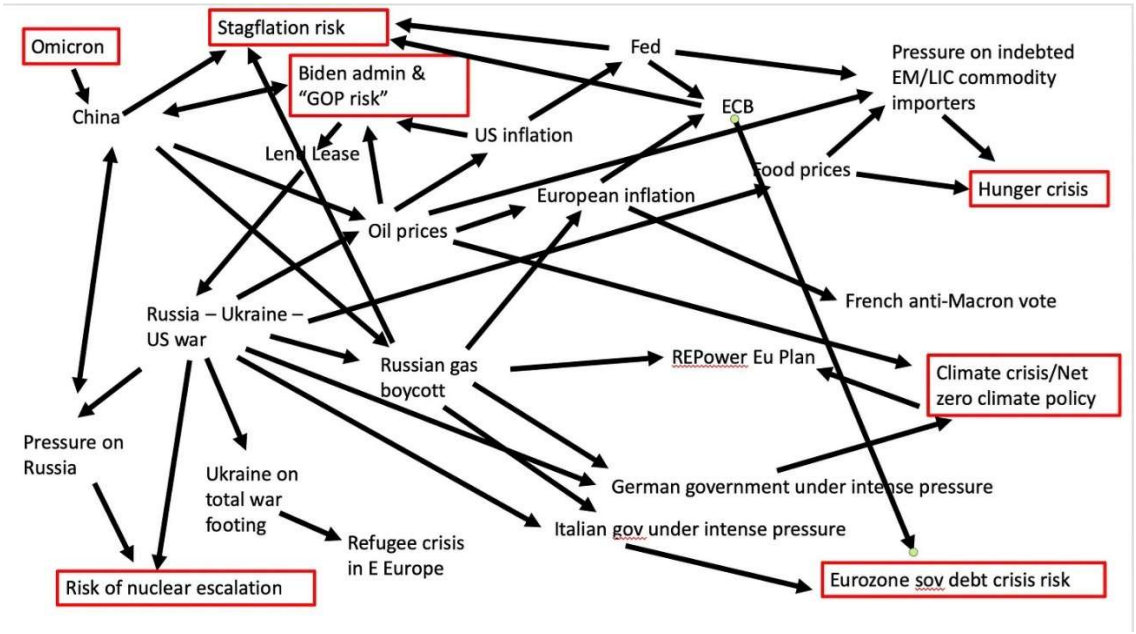

Image 1: Krisenbilder. Source: Adam Tooze (2022).

In the same we can see the total interrelation between systems and subsystems, even, I think it is pertinent to consider that to the same we can add recent events as being: a) the new mandate of Donald Trump and the reissue of the trade battle with China through a tariff war, in which the pre-eminence of the crisis of the international economic system impacts on the totality of the sub-themes and b) within our competence, the international maritime transport subsystem, directly affected by these measures.

Tooze (2002 b), in alignment with Morin and Kern, mentions that "In the polycrisis, the shocks are disparate, but they interact so that the whole is even more overwhelming than the sum of the parts."

In my opinion, the best developers of the theory of polycrisis and its conceptual and epistemological foundation are the academics Martin Lawrence, Thomas Homer - Dixon and Scott Janzwood from the Cascade Institute in Victoria, Canada, who state that:

"Our elaboration of the polycrisis concept here adopts two core implications of this systemic risk idea:

1) Intra-systemic impact: A disruption that affects one part or area of a single system quickly spreads to disturb the entire system (via multiple, ramifying chains of cause and effect, or some form of contagion, through the system's causal network).
2) Inter-systemic impact: The disruption of the initial system may spill outside that system's boundaries to disrupt other systems" (Lawrence et All, 2024:3)

And besides this, when asked if the world is in a polycrisis? Determine that:

"We argue here that the world is currently experiencing a global polycrisis and that this situation is worsening. Constituent crises include the lingering health, social, and economic effects of the Covid-19 pandemic; stagflation (a persistent combination of inflation and low growth); volatility in global food and energy markets; geopolitical conflict, especially between assertive authoritarian regimes (including China and Russia) and the democratic West, which is leading to a partial decoupling of American and Chinese economies; political instability and civil unrest in countries both rich and poor arising from economic insecurity, ideological extremism,

political polarization, and declining institutional legitimacy; and increasingly frequent and devastating weather events generated by climate heating. These crises are destroying livelihoods and lives around the globe and are undoubtedly diminishing humanity's prospects. Moreover, they are certainly interconnected, although exactly how remains unclear."
Below we can see the following graphical representation:

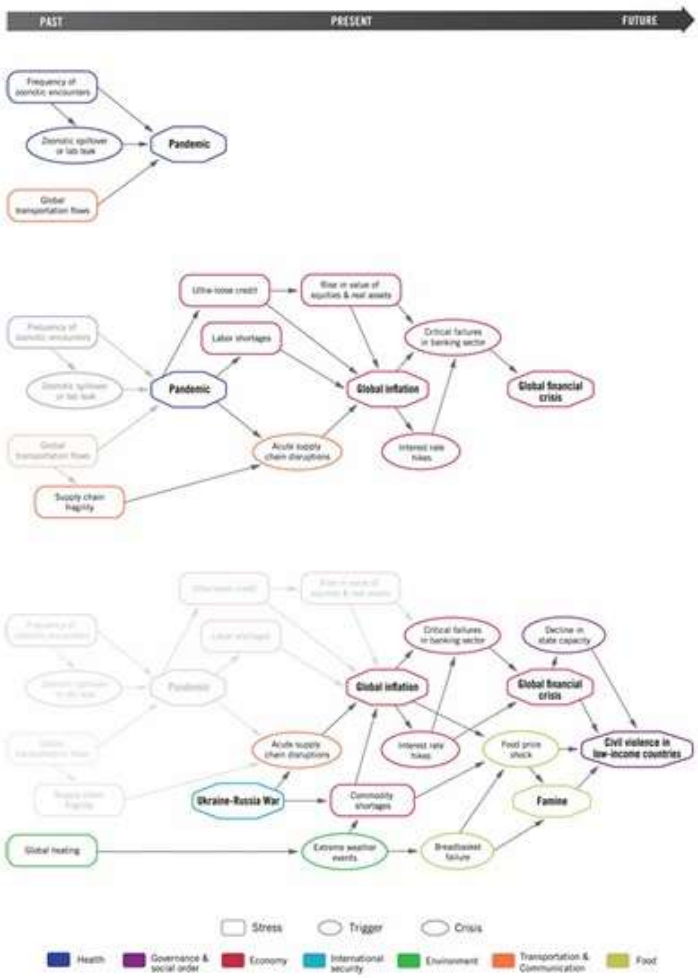

Image 2: Polycrisis representation. Source Jacob Buuma in Lawrence et all (2024)

The graph shows us the temporal evolution of the polycrisis, It should be emphasized that a substantial point of its proposal is the combination of long-term processes with unforeseen events in the configuration of the crises. Underlying the idea of "Black Swan" by Nassim Taleb (200), facts that seem impossible, but sometimes occur, have an extreme impact, endow systems with an unequalled level of uncertainty, and then later try to rationalize and explain themselves.
But perhaps most relevant of all is that the concept of polycrisis as a systemic explanation of present-day events was not only anchored in the academic sphere, but also extended it into the realm of policymakers, becoming a central topic of debate at the World Economic Forum (WEF) summit in Davos 2023, leading to heated discussions about whether or not we are immersed in a global polycrisis.

In this inaugural panel of the 2023 WEF summit, “De-globalization or Re-globalization?” Historian Niall Ferguson dismisses polycrisis as an “illusion” or “mirage” and argues that humanity’s present troubles are “just history happening”, on the opposite side to Adam Tooze. Finally, the WEF’s risky reports (2023:6) conclude that:
“The world is facing a set of risks that feel both wholly new and eerily familiar. We have seen a return of “older” risks – inflation, cost-of-living crises, trade wars, capital outflows from emerging markets, widespread social unrest, geopolitical confrontation, and the spectre of nuclear warfare, which few of this generation’s business leaders and public policymakers have experienced. These are being amplified by comparatively new developments in the global risks landscape, including unsustainable levels of debt, a new era of low growth, low global investment and de-globalization, a decline in human development after decades of progress, rapid and unconstrained development of dual-use (civilian and military) technologies, and the growing pressure of climate change impacts and ambitions in an ever shrinking window for transition to a 1.5°C world. Together, these are converging to shape a unique, uncertain, and turbulent decade to come.”

Image 3: Interconnection Map. Source: WEF. Global Risks Perception Survey 2022-23

Continuing with the development, I focus on the following concept, which provides the temporary notion of crisis in the system, called permacrisis. Although the enunciation of the concept dates back a little over five years (Castells, 2018), it gained notoriety in the incipient phase of the exit from the pandemic when it was declared "word of the year" by the Collins dictionary. He defined it as "a prolonged period of instability and insecurity, especially the result of a series of catastrophic events".

In line with this, Merejo (2023:19) argues that "Permacrisis is a term describing the state of permanent crisis, in which crisis sequences are unpredictable, and one has not emerged from a crisis when we enter into others" and in such harmony Mendez (2023:8) highlights that "The surprising accumulation of critical situations, which began to permeate the collective consciousness in recent years and even gave rise to the concept of permacrisis, seems to endow this time with a certain identity and continuity."
If we go back in time, despite the absence of the term 'crisis', I believe that the economic crisis of 2008 initiated a continuous process that was unable to be overcome. Suppose the sum of crises of the various subsystems has plunged us into a crisis over the last 25 years. In that case, the permanence in time of periods of instability has added to their temporality.
For Instance, the international maritime transport subsystem is of great interest to us. Logistics and navigation of ships have experienced more disruptions than ever in the past five years, and it doesn't appear that this dynamic can be reversed.

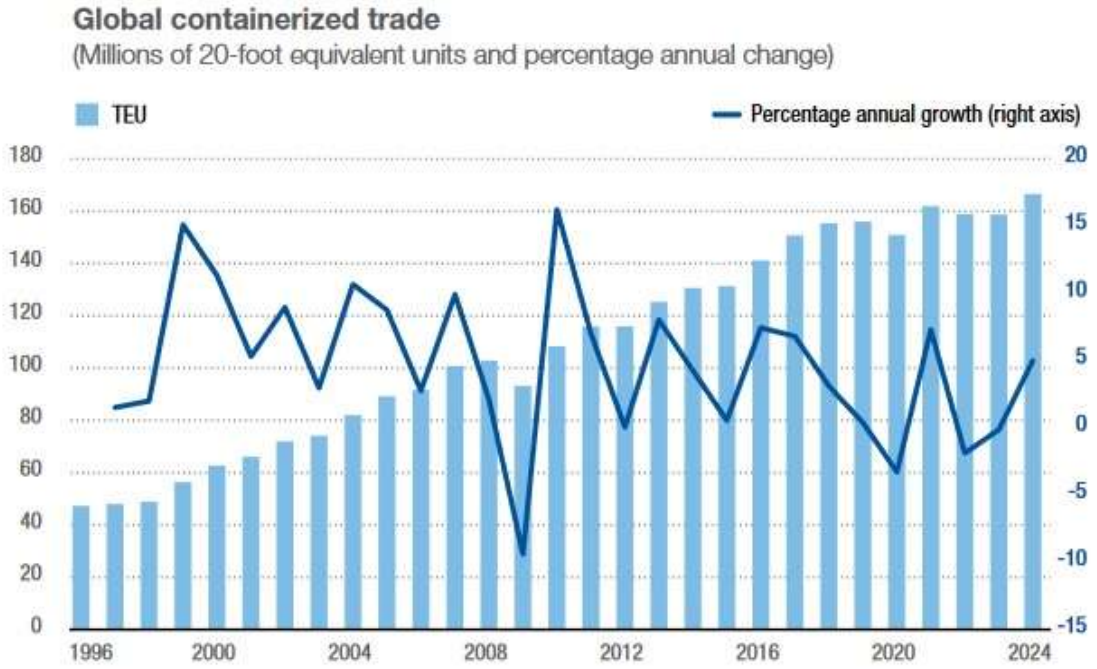

Image 4: Global Containerized trade. Source: UNCTAD (2024)

The above graph, which was selected at random but is inserted within the maritime transport subsystem of interest to us and shows the exchange of containerized cargo over the last 25 years, gives us a parameter of the beginning of the polycrisis. The dramatic fall in the global economic crisis of 2008, which resulted in negative growth, gives us a sign of the origin of that crisis that continues to this day.
As a corollary of the above concepts, we come to the consequence derived from the combination of polycrisis + permacrisis and is the notion of entropy or "entropic world". This concept, taken from physics, was quickly adapted by various authors, since it measures the reality of the international system. The notion of entropy is used to measure the disorder of a system; that is, the greater the entropy, the greater the disorder. As Randall Schweller (2014) states, "we have moved from the age of order to the age of entropy," which is characterized by:

“a chaotic period where most anything can happen and little can be predicted; where yesterday’s rule takers become tomorrow’s rule makers, but no one follows rules anymore; where competing global visions collide with each other; where remnants of the past, present, and future coexist simultaneously. In this world, global interdependence is increasing, power is diffusing, and multilateral cooperation is dwindling; capabilities to block, disable, damage, and destroy prevail over those to adopt, enable, repair, and build; where geography no longer distinguishes friends from enemies, and no one can be trusted.” (Schweller, 2014:14) and following this… “Rising entropy is not only a structural problem that affects states at the macro- or global level of world politics. It is also engulfing the system’s processes at both the macro-level (e.g., the diffusion of power; the increase in the number and variety of influential transnational actors) and the micro-level—the level of individual agency and human social interactions—with enormous implications for regular people in their everyday lives.” (Schweller, 2014:40).

On the contrary, some authors certainly see the entropic context as positive, considering that “global entropy doesn’t solely imply fragmentation. To the contrary, the system exhibits characteristics of self-organization, even aggregation, into new patterns and formations… The universal reach and penetration of connectivity enables authorities of all kinds to forge bonds more effectively real than the many states that exist more on maps than in their peoples’ reality. The world comes together — even as it falls apart” (Khanna, 2024).

However, by Actis & Creus (2020), I consider the global entropy (both in its normative and philosophical framework) as a pessimistic version of the theory of complex interdependence in uncertainty, and the unpredictable elements that undermine the ability to order. For our case analysis, I consider what Schweller has expressed as nodal, since it will allow us to analyse our activity from the macro level and the individual maritime agent from the micro level.

THE SHIP AGENT IN ENTROPIC CONTEXTS

Considering that the previous theoretical development shows us the world submerged in the condition of entropy, we must go back to the questions of the problem that we stated in the introduction: How does the maritime agent operate in this type of context? From the perspective of the ship agent, dealing with such disharmonious situations as environmental problems, geopolitical tensions, and the revolution of artificial intelligence has a direct effect on maritime transportation, port management, and ship management.

The first thing to highlight and which allows us to analyse activity on a global scale is the "universal" status of the maritime agent, as defined by the Oxford dictionary "made by or involving all people in the world or a particular group", that the ship agency and the agent perform functions similar throughout the globe. From my point of view, I understand the maritime agent from a broad vision, fundamental and necessary since it executes the performance of formalities with the competent authorities (Coastguard, Customs House, National Migration) for the vessel's entry, stay, and departure from port. He may be designated by the master, owner, shipowner, or charterer of the vessel, and the regulations grant him the status of legal representative of the ship. In turn, among the many functions, it assists the captain in the nautical management of the vessel as being supply (Bunkers, provision, Spare parts etc.), coordination of services of pilotage, mooring, etc. and in commercial management

(preparation and signing of documents such as manifests, bills of lading, etc.) with their nuances of each country. In this case, if there are inequalities in the levels of entropy according to the country concerned, it is not the same activity of a maritime agent in countries affected by, e.g., war conflicts (Ukraine) or by latent threats (area of the Red Sea) as in areas absent from conflict.

The second affirmation, partly clarifies the first of the questions about how to operate in entropic contexts and lies in the very nature at micro level of maritime agency which consists in an activity that is born, it grows, develops and dies in situations of entropy; generally the notion of order is absent in the maritime agency, and this can be determined by the following points:

A. As activity derived in the first instance from the worldwide marine transport, and in the second instance from the port operations, the availability 24/7 "Around the clock" of the marine agent determines temporary disorder. Not only availability is required for the arrival of the ship to the port complex, but all prior communication in two ways (on the one hand between agent - ship/ customer and another agent - national actors (terminals/ authorities, etc.) and on the other the post leaves ship (customer request for clarification on scale, request for documents, etc.) make it unpredictable.

B. As integrator of all actors in the chain, during the vessel's port of call, a ship agent is the articulator of multiple actors with sometimes conflicting interests. Agents representing the shipowner, agents representing the charterer, stevedoring companies, surveyors, shippers, customs brokers, pilotage companies, terminal representatives, etc, which always concentrate the consultation and requirements on the agent. As Delfino (2018) states, "plans its tasks intending to ensure that the ship performs an effective and efficient operation, minimizes delays and costs under criteria of simplification and competitiveness." paradoxically is considered the weakest link in this chain, on which complaints are usually presented against the inconveniences of both its client and external ones, but it is who diagrams and executes the solutions, resuming Delfino is in itself a link where legal, commercial, logistical and technical requirements and knowledge converge. A real pivot, without which the maritime trade could not develop". This again shows us the entropic character at the micro level.

C. And finally, on the level of inter-agency competition, according to Lupano (2023:33), "corresponds to the degree of uncertainty that a company faces, given a market structure, to keep a random customer. The higher the entropy level, the greater the uncertainty of a given company to retain a customer, and the greater the competition in the market". In this sense, the common denominator in most countries is a highly entropic atomised market of agencies offering services. The users (shipowners, charterers, etc.) miss a level of performance in management that is related to the quality of services and the speed with which they are provided to the ship. To paraphrase Talley (2009), the conjunction of maximum performance must be related to the level of resources and cost optimization in customer service. In the quest to obtain their statistics, the application of the Theil index would allow us to have an image of the entropic level of this type of market.

On the other hand, at the macro level, and to answer the second question of the problem, it is necessary that the maritime agent can have a holistic view of the world in which he operates and where he goes. This tool can be utilized to enhance activity. Considering the complexity of today's world and the overlap of the crises, I will detail three subsystems that intersect with the World Economic System and international maritime transport, resulting in distortions of activity as we know it, which the agent needs to understand, assimilate, educate, and upgrade to provide superior service:

1) Geopolitical: I mentioned earlier that those geopolitical issues partly determined the degree of entropy because it is not the same to be in conflict zones as in peace zones. On the other hand, unresolved conflicts such as the War between Russia and Ukraine, the Houthis threat in the Red Sea, the notion of "Geopolitics of the Trump administration's accesses", even mentioning the need to buy Greenland or regain control of the Panama Canal to dominate the predominant trade routes, as well as the new trade war implemented by Trump that links economic - political aspects must be understood by actors in the context of the same impact on global, regional and local scale in the flows of ships arriving at ports. In this same section, I think it is necessary to develop also the internal aspects of the countries themselves. In developing countries, as well detailed by Aldrick (2017) in his analysis of the maritime agency situation in Africa, countries present the following characteristic:

a) Poor infrastructure - road, rail, electricity, water, telecommunications
b) Low per capita income and inadequate social support systems
c) Low level of ICT capabilities
d) Complicated Government procedures
e) Poor security
f) Corruption
g) Inadequate or antiquated legislative regimes.

This situation can be extrapolated to other developing areas, such as Latin America, and progress is much slower than in developed zones such as Western Europe. If we look at the World Bank's annual logistics index, we can see this reality. There is a need for the exchange of information between maritime agents from more entropic areas to those from less entropic areas to condense different realities and how to operate in uncertainty.

2) The second subsystem to highlight is the environmental subsystem. On the one hand, and related to the previous point, certain issues are subject to new sea routes such as the Northwest Passage and the Northern Sea Route. are a consequence of global warming. By 2030, the Arctic is expected to be passable for two months a year, something that has not been thought of shortly. In addition, the drought in the Panama Canal led to a reduction in the passage of ships by almost 25% during some months of 2024 to save water. These phenomena, which are increasingly present, are linked to disruptions in maritime traffic. On the other hand, the environmental issue is very present in ship operators, many of the consultations before the arrival of a ship are about emission issues (types of fuels to be used, use of scrubbers, etc.), issues relating to the treatment of ballast water, grey water, sludge, etc., and in the treatment of waste, etc. At this point, the agent must follow the regulations of the world-leading authority, the International Maritime Organization (IMO),

and how they are internalized and applied within their countries. MARPOL and its annexes, the Ballast Water Management convention, etc, are essential for prompt customer advice during a ship's port call. As Llerena (2025:17) says, "As environmental compliance becomes more complex, ship agents help their customers meet emission standards, organize fuel alternatives (e.g., biofuels), and ensure that environmental guidelines are followed during port visits. In addition, agents help to obtain the necessary certifications and assist shipowners and operators to avoid penalties by being ahead of regulatory requirements". The environmental subsystem is expected to be one of the most affected by the inputs and outputs of the remaining subsystems in the future, and its evolution will have to be closely monitored.

3) Finally, the subsystem we will address is the Technological one, as it presents itself in the future (unlike the environmental one) with the ability for its inputs and outputs to affect the rest of the subsystems. Decentralization and speed of access to information, the emergence of AI and Big Data, as Actis & Creus (2020:108) argue "the power in the era of the fourth industrial revolution is in the management of information, and it will reside in those - states or companies- that manage to control, collect and process them efficiently". In the case of the maritime industry, for some years now, it has been undergoing a process of exploiting these new technologies, which has led to the automation of ports. As Ray (2024:159) "the smart port is part of the new technologies, and these modern systems have remotely controlled cranes, automatic cargo handling, digital displays, among other devices. The way everything works seamlessly in this operation connotes a very efficient environment to work with." On the other hand, its use in ships is particularly beneficial in optimizing fuel consumption issues, shipping routes, etc. Nevertheless, from my point of view, the Maritime agent is the latest resistance to the technological revolution of AI, as certain issues still cannot be addressed or solved by generative intelligence. It is true, as Ray (2024) points out, that new tools redefine the task of the maritime agent e.g. Electronic Data Interchange (EDI) which Automating documentation processes, reducing paperwork, and minimizing errors or Blockchain which Providing secure, transparent, and immutable records of transactions, improving trust and efficiency in the supply chain. However, the Maritime agent still must perform several field work duties, such as assisting the vessel during inspections by authorities (Coastguard, Customs House, Migrations, etc.) The Ship agent of this age must be positioned in the middle, not considering AI as an end, but as a useful tool for carrying out activity in a fast-moving world.

CONCLUSION

In a constantly changing world, which is interrelated in all areas, where an event in one subsystem tends to impact and replicate itself in another, where the primacy of technology drives the mastery of new tools, I can conclude that the current maritime agent is in good health and remains the cornerstone of a ship's port of call. And this good health is determined by being a figure with the capacity to act in entropic contexts from time immemorial. The ability to solve on the fly, to keep the customer informed in real time, its mixed mastery of both technological field and field work, and its adaptability make it the irreplaceable link of the maritime industry. In addition, it is the last land anchor of activity since it knows the port and territory as none. I share with Llerena the following reflection: "In essence, independent naval agents are reactive and proactive facilitators, helping to navigate the stormy seas of market volatility, geopolitical risks, technological change, and environmental demands, safeguard not only the ship and its crew, but also the integrity of the entire supply chain."
Not remaining in an isolated local approach of the maritime agency, being open to new tools and knowledge, and promoting a holistic view of activity will make the maritime agent a central figure of the industry until the end of days.

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CHALLENGES AND OPPORTUNITIES OF THE DIGITAL TRANSFORMATION OF A SHIPPING AGENCY COMPANY

RODRIGO LOPES AVILA

BRAZIL

2025

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BRAZIL

INTRODUCTION

The lives of people, as well as the work they perform, have been transformed by technological and digital advancements across the globe. In this regard, companies and organizations need to adapt their people and work groups, redesign their processes, and include new technologies to remain updated and competitive. This Digital Transformation [DT] has led companies to an unprecedented competitive environment, where new opportunities, ways of working, and challenges arise for all types of organizations and companies (Froehlich et al., 2023).

The Digital Transformation is a method that aims to improve a company or business unit by utilizing not only information technologies but also integrating elements such as communication and connectivity, with new “software” and “hardware.” Continuous Digital Transformation demands modifications throughout the Company, from its culture, business strategy, and people, including leadership and work teams (Froehlich et al., 2023).

The breadth to which change is disseminated, as well as its essence, helps explain why innovations and disruptions with past methods are so accentuated nowadays. Furthermore, the speed with which new technologies emerge and are shared is faster than ever, while the technologies and companies that represent these transformations today were not as well-known just a few years ago (Schwab, 2017).

The evolution from a traditional company to a digital company through Digital Transformation is imaginable; however, there is an important element in this context, which is considering people as central and their correct involvement in the transformation, including concerns about what they feel and how they are living, as they are affected in various sectors of life within organizations and personally (Lara et al., 2023).

Several increments and changes are caused by Digital Transformation in various aspects of society, as the need arises to deal with advanced technologies and digitalization. In this sense, investments in the development and qualification of professionals to insert themselves into this model appear as fundamental. Beyond the technological side that is developed for such transformations, Digital Transformation demands that people acquire new knowledge and competencies for those who are inserted in this environment. In order to achieve digital maturity through the promotion of Digital Transformation, the involvement of leaders and transformation agents is essential, in order to break with past business visions, as well as stimulate the adoption of new business models (Dillenburg et al., 2023).

With the advancement of Industry 4.0 and Digital Transformation, several benefits, as well as equally proportioned challenges, will emerge. Such challenges are difficult to quantify, as most people perform more than one role in society, sometimes being a producer, sometimes being a consumer, and innovations and transformations will impact people's well-being both positively and negatively (Schwab, 2017).

This context of Digital Transformation has altered various segments, including the maritime industry, which, despite having a central role in international trade and cargo transport, is not characterized as a precursor in digitalization. Furthermore, the maritime industry faces various

challenges, such as high fragmentation, manual processes, and outdated interfaces between stakeholders, among others. On the other hand, such challenges present opportunities to increase the performance and economic environment of those involved in the maritime industry (Raza et al., 2022).

The involvement of different actors in the maritime industry, such as shipping agents, shipowners, port terminals, and customs authorities, forms the environment of maritime practices, where each uses different infrastructures and systems, making collaboration and interaction more difficult. In this sense, for the maritime industry to remain attractive and competitive, a new digital environment based on data sharing among actors will need to be created, evolving in visibility, agility, predictability, and, at times, a better data-driven decision-making process (Raza et al., 2022).

Based on the above, the present work becomes relevant within the scope of the company in question, since it has been one of the actors in the maritime industry for over 180 years and has been undergoing this process of digital transformation. The general objective of the work is to identify the main challenges faced and opportunities that have arisen for a maritime agency company during its digital transformation process.

METHODOLOGY

For the realization of this study, the qualitative method was chosen, since the general and specific objectives refer to the digital transformation process of the company under study. Furthermore, it is a source with a solid foundation and with details about human processes. The strategy used for this study was a case study analysis, which used open-ended questions to describe a social phenomenon (Nascimento, 2018).

The context of the present study took place in a port logistics operations company operating in the Brazilian market since 1837, which has a business portfolio along the Brazilian maritime coast that includes port terminals, maritime towage, logistics, shipyard, offshore support vessels, and maritime agency, which was the business unit chosen for the realization of this study. The maritime agency business unit began its digital transformation process around 2018; moreover, the study being focused on a single business unit of the group is justified by the author's access to the company's employees. Furthermore, this business unit has an administrative support structure, including Processes and Quality, Market Intelligence, Administrative and Financial, Information Technology, as well as the operational area, responsible for the execution of the end activities and service to the vessels represented by the company (Nascimento, 2018).

For the data collection stage, primary data obtained through interviews were primarily used, conducted using an interview script adapted from that proposed by Nascimento (2018), as per Table 1, with those who had, or still have, involvement in the digital transformation process.

Managers	Non-managers

How do you understand the digital transformation process in the company? In your opinion, what are the main challenges and opportunities of digital transformation?	How do you understand the digital process in the company? In your opinion, what are the main challenges and opportunities of this process?
In your opinion, what are the impacts and difficulties of the digital transformation process in the company?	In your opinion, what are the impacts and difficulties of implementing this digital process in the company?
In your opinion, has digital transformation changed the relationship between the company's areas? Do you understand that this change in the relationship has brought impacts to your area? If yes, what type of impact can be observed?	In your opinion, has the digital process changed the relationship between the company's areas? Do you understand that this change in relationship has brought impacts to your area? If yes, what type of impact can be observed?
In your understanding, what is the contribution of your area to the company's digital transformation?	In your understanding, what is the contribution of your area to the company's digital process?
What is the impact on the company of the digital initiatives being implemented?	What is the impact on the company of the digital initiatives being implemented?
In your opinion, does digital transformation have any effect on the Company's business model? How do you see the Company's adaptation to this new business model?	In your opinion, does the digital process have any effect on how the company does its business? How do you see the Company's adaptation to this new business model?
In your opinion, what are the next steps for digital transformation in the company?	In your opinion, what are the next steps for the digital process for the company?
What do you understand by digital strategy? And what do you think needs to be considered in preparing the digital strategy?	How do you see management before the start of the digital processes and after the start of the implementation of the digital processes?
How do you see management before the digital transformation process and after the digital transformation process?	How do you see the behaviour of your colleagues before and after the implementation of the digital processes?

Table 1: Interview script adapted from Nascimento (2018)

The selection of the population for this study was based not only on employees who promoted and induced the digital transformation process but also on those whose work was impacted by

it, such that they are familiar with the impacts on their activities. Table 2 presents the employees who were interviewed, whether they belong to the managerial or non-managerial staff, as well as their time with the company under study. Eight interviews were conducted, four with employees belonging to the managerial staff and four with non-managerial employees.

Employee	Role	Time at the Company	Interview Duration
E1	Manager	10y 10m	25min
E2	Non-manager	2y 5m	20min
E3	Non-manager	5y 1m	11min
E4	Manager	9y 10m	25min
E5	Manager	12y 4m	13min
E6	Manager	17y 0m	15min
E7	Non-manager	2y 3m	31min
E8	Non-manager	2y 1m	16min

Table 2: List of interviewed employees

Source: Original research data

For the data analysis stage, the primary data obtained through recorded interviews required some processing; in this sense, literal transcriptions of the audio were made immediately after the interviews concluded for better analysis (Nascimento, 2018). Appendix 1 presents an example of a transcription performed. Furthermore, in the data analysis, an effort was made to divide the responses and content shared by the interviewees according to the objectives of the present study, classifying them into Analysis of the opportunities of digital transformation [DT]; Analysis of the challenges of digital transformation; and finally, Analysis of the impacts of digital transformation, observing the information from both non-managerial and managerial employees of the company. In order to obtain a categorization of the topics discussed in the interviews, the most relevant excerpts from the interviews were grouped together and subsequently categorized according to the type of subject being discussed.

RESULTS AND DISCUSSION

To analyse the results achieved, they were divided into categories according to the objective of the study. Therefore, the results obtained were divided into Analysis of Opportunities, Analysis of Challenges, and finally, Analysis of Impacts. Furthermore, they were divided into analyses of the company's non-managers and managers.

ANALYSIS OF OPPORTUNITIES - NON-MANAGERS

From the perspective of non-managerial employees, digital transformation should be a company initiative, with the goal of remaining updated and competitive in the market and creating opportunities, which include the improvement of operational routines and an increased focus on the quality delivered to the client, through the development of systems and automations. As highlighted by Martins et al. (2023), these digital initiatives are considered essential for the future of the company. Table 3 presents the structure of excerpts and categories that support the understanding of Digital Transformation opportunities according to the interviewed non-managers.

Description: Facilitates the company's updating and employee engagement in new digital practices and processes.	Initiative and Digital Culture
Interview excerpts: - The digital process has to come from the company, because technology advances more every day, and has to be adapted within the company. - Creation of a digital transformation agenda and dissemination of courses to attract volunteers to specialize. - Because we have a management that believes in digital transformation, which already has a direct link with information technology, IT, it ends up being a motivator for us to evolve in Digital Transformation. - Here we have a very strong culture of having in-house systems, systems that are created by us.	
Description: Adoption of systems and automation to simplify operational routines, increasing efficiency.	Process Improvement
Interview excerpts: - Improve what we already have and simplify our work. - We simplify processes so that the company has this continuity.	

- Developing systems, developing automation would also help a lot in daily processes.	
Description: Generate value for the client through a more agile service, increasing satisfaction and loyalty.	Customer Focus
Interview excerpts: - And get new clients, go after innovation, which is what everyone wants today. - So having innovation, communication, everything that is aligned with digital transformation in our DNA becomes an opportunity for us to show it as a differential. - Having these systems is an opportunity to show the client what we are doing, that we are striving, show that we are moving forward with digital transformation, and make their life easier.	

Table 3: Analysis of opportunities from the perspective of non-managers

Source: Original research data

In general, from the perspective of non-managerial employees, digital transformation not only improves the efficiency of internal processes but also frees up employees to focus on activities that provide a better customer experience and contribute to the growth and modernization of the company.

ANALYSIS OF OPPORTUNITIES - MANAGERS

For the Company's managers, digital transformation offers a series of significant opportunities for a maritime agency, presenting positive impacts on operational and strategic aspects. Improvements can occur in routine processes, allowing employees to dedicate themselves to other aspects, such as self-development and the quality perceived by clients. Furthermore, it enables more rational management through dashboards and real-time updated data. Similar results were found by Klein and Todesco (2020), who highlight benefits such as operational excellence and company procedures, improved customer relationships through more customized service delivery, and increased customer satisfaction with data delivery according to their preferences. Table 4 presents the structure of excerpts and categories that support the understanding of Digital Transformation opportunities according to the interviewed managers.

Description: Free up time for team training and development, allowing greater focus on service quality.	Operational Excellence
Interview excerpts: - Opportunity, you certainly, with digital transformation, can have more time for teams to develop and train better, free up time for you to serve better, and spend more time on excellence, and not on very routine or unintelligent processes that could be automated. - Automation and digitalization of processes reduce operation time and costs.	
Description: Real-time dashboards for more informed and data-driven decisions.	Data-Driven Management
Interview excerpts: - The use of real-time data allows for more informed decisions, such as the operational panel dashboard. - More focused on data, you start to leverage it more intelligently, and start getting insights from analysed data.	
Description: Use of global systems allows for improvements in interaction and transparency with clients.	Expansion of Digital Solutions
Interview excerpts: - We have the opportunity to be here in Brazil using software developed in Israel that has a market not so similar to ours, but they can perfectly understand our needs. - So, if we don't look outside at what the world is doing, we will be left behind, and we will be swallowed by this wave. - Digital solutions can improve communication and customer service, offering greater transparency and agility.	

Table 4: Analysis of opportunities from the perspective of managers

Source: Original research data

In the perception of the managers, with digital transformation, the geographic barriers that existed until then are reduced, where the adaptation of systems from other regions of the world and other market segments is viable, in such a way that the use of these systems allows for better data analysis, as well as providing digital solutions to clients and perceiving growth opportunities that, in a context of fragmented or outdated data, would not be feasible. Frare et

al. (2022) emphasize that the competence to process data and information is fundamental to predicting market changes, allowing companies to adjust their services to meet customer expectations.

For the interviewed managers, digital transformation is characterized as an opportunity for the growth and optimization of the maritime agency's operations, within the category of "Process Improvement." Improvements are seen in process automation and online data analysis, allowing for more strategic and efficient decisions. Furthermore, as described in the "Customer Focus" category, digital transformation allows for greater attention to the client, with more personalized solutions, optimizing service, and increasing satisfaction.

ANALYSIS OF CHALLENGES - NON-MANAGERS

The human factor was the most highlighted as the greatest challenge for Digital Transformation in the company, whether due to resistance to adopting a new digital culture, where it is necessary to adapt to new systems, technologies, and methodologies for carrying out a process, or due to the difficulty in finding qualified professionals in the market or in developing new knowledge and skills within the company. Digital transformation requires capable people with specific skills to deal with new technologies and systems.

Furthermore, technical issues were also highlighted as challenges to be overcome, given the complexity of the processes inherent to maritime agencies, as well as the adaptation of old systems to new technologies. Still, on technical issues, the management, processing, and storage of an ever-increasing volume of data also emerge as a challenge. According to Oliveira et al. (2023), data can be considered fundamental intangible assets for value creation, such that accessing existing information allows for the exploration of new business opportunities. Table 5 presents the structure of excerpts and categories that support the understanding of Digital Transformation challenges according to the interviewed non-managers.

Description: Employee resistance to new digital systems and methodologies.	Culture Change
Interview excerpts: - When someone arrives with a very good idea to implement, to make things easier, but it depends on a system, on a program, there is a certain difficulty in assimilating it. - The challenges are staff adaptation, people's resistance to change. - A challenge is changing the culture, even though this process is very good and helps us, I think the culture is still a problem.	

Description: Need to find or develop qualified professionals in advanced technologies and systems.	Professional Profile
Interview excerpts: - It is finding qualified labour in the market or qualifying the labour that is already within the company, because to make any transformation, we need people capable of doing it. - Lack of qualified professionals in the IT area, someone who understands the business, who understands maritime agency, or who also understands what the client wants and who really understands our systems. - It comes down to the qualification of professionals, because as we are in this digital era, digital transformation, we have people who move along with this change in the flow that is happening, but there are some who don't keep up as much.	
Description: Difficulty in integrating new systems with legacy systems and in managing large volumes of data.	System Complexity
Interview excerpts: - There is this issue of being centennial; there are many very old systems, and they are not close to the new technologies we see. - We have a very large volume of data, an exponential volume of data, so every day that passes, this data grows more, and to manage this data, clean this data, and use it in a more qualitative way.	

Table 5: Analysis of challenges from the perspective of non-managers

Source: Original research data

The challenges faced by non-managers regarding digital transformation are directly related to the human factor and technological adaptation, with resistance to cultural change, the difficulty in finding and qualifying professionals with the necessary skills, and the complexity of old systems being significant barriers to the success of this transition.

ANALYSIS OF CHALLENGES - MANAGERS

One of the biggest challenges highlighted was changing the culture, both of employees and target markets, such that top management is demanded to be the greatest promoter of this transformation and that middle leadership be multipliers of this transformation throughout the Company; according to Alcantara et al. (2024), the most critical factor for the success of adopting new digital processes is organizational culture. Also within the cultural scope, being a very traditional sector, there is the challenge of promoting the benefits of digital transformation among clients, so that they see value in the Company's initiatives.

Digital transformation requires a critical analysis of the current structure and investments in new infrastructure to overcome existing technical challenges. To achieve the Company's strategic objectives, it is necessary for as many processes as possible to be automated and for data to be well utilized. If the structure does not meet the needs, investments are necessary. Table 6 presents the structure of excerpts and categories that support the understanding of the challenges of Digital Transformation according to the interviewed managers.

Description: Requires top management to promote changes and engage all hierarchical levels for the digital transition.	Organizational Culture Transformation
Interview excerpts: - The main challenge is making both the people at the top who manage this company, and the people at the front applying these changes, understand its importance. - The difficulty is the issue of the team's culture; to work with digital transformation, you have to start from top to bottom, you have to have this guidance and objective from the board. - As the sector is traditional and conservative, many professionals may resist change, preferring established methods. - The team has to understand the seriousness of this transformation, and we have to be able to apply it in the best way. - You have the team that embraces a dashboard, an analysis, and you have the team that doesn't want to know about that, the team that is still with pen and paper, they want to call you and know, right? So you have to, depending on the scenario, you have to sell internally and sell externally.	

Description: Need for investments in new systems, automation, and technological integration to support Digital Transformation.	
Interview excerpts: - The integration of new technologies with legacy systems can be complicated and expensive. - It's about having as many processes as possible running within the systems, and with as much automation as possible and as much updating, utilization, and handling of data and information as possible. Does the structure meet the needs? Does it require investments in structure?	Technical and Infrastructure Challenges
Description: Requires rapid adaptation and digitalization to meet customer expectations and remain relevant in the market.	
Interview excerpts: - We act as intermediaries and with the advancement of technology, it's natural for the client to have much better and greater access to information. - Before, a good part of the services contracted by the Shipowner, whom we represent, were 100%, as a rule, contracted by the agency; today you already see a lot of direct contracting, so, it's as if we were doing a little less and less. - The digital transformation process is necessary, and companies that refuse to make this type of move will eventually be surpassed by all others.	Market Competitiveness

Table 6: Analysis of challenges from the perspective of managers

Source: Original research data

Digital transformation in a maritime agency presents complex and diverse challenges, given the characteristics of the market, acting as an intermediary between various players such as shipowners, charterers, exporters, and importers. Due to the advancement of technology, clients have easy access to more complete and updated information, naturally changing the dynamic of contracted services and allowing for greater comparison among competing agencies.

ANALYSIS OF IMPACTS - NON-MANAGERS

The impacts of Digital Transformation appear early in its process, as it demands high team engagement for the implementation of new processes and monitoring their adherence and adaptation. Once this initial stage is overcome, the company can begin to reap the fruits of digital transformation, leveraging the benefits of more efficient and technological processes, altering its business model, especially in the commercial department, with the capacity to present clients with detailed and sophisticated analyses obtained through the new systems.

The digital transformation process brings financial impacts for the company, given the volume of resources demanded for the development and creation of new systems, as well as the creation and maintenance of a qualified team for the new systems, in line with Daxbacher et al. (2023), where there is significant financial investment and profound modifications in the organization's processes. Furthermore, such cost is revealed to be higher due to the Company's policy of developing its own systems.

Impacts are also identified in the way the company is managed, as well as expectations about the role of leadership, where managers play a fundamental part in promoting the company's digital strategies, assisting in the implementation of digital processes, and controlling and demanding data quality from the teams. As highlighted by Martins et al. (2023), where leadership has a role as a reference, an incentive, and a legitimizer of the Digital Transformation and learning process. Table 7 presents the structure of excerpts and categories that support the understanding of the impacts of Digital Transformation according to the interviewed non-managers.

Description: Digital Transformation allows for faster and differentiated services, increasing the company's competitiveness.	Business Model
Interview excerpts: - The company will become much more competitive when it has digital transformation; you have much faster information, much better refined, quality information, much more interesting to be shared with clients. - It makes a big difference, especially in commercial meetings when presenting to clients the way and the analyses we can do. - Today, as we have a very broad view of the market because we have a lot of information, and digital transformation has to do with information, because we have a lot of information, we can capture opportunities, perceptions, market changes.	

- The digital process brings authority to the company, brings security, both for the company acting as an agency and for the client hiring us.	
Description: The digitalization process requires high investments in technology and training.	Transformation Costs
Interview excerpts: - There will be a cost impact; the cost is very high; any type of improvement we have to make in the system is very expensive. - Professionals who are linked to this are not easy to find in the market, not easy to retain; we need more people. - What's worthwhile is creating this in-house system, which is much more expensive, much more laborious, demands a lot of time, demands a lot of effort, than us buying a ready-made platform.	
Description: The role of managers is essential for the success of Digital Transformation, promoting adherence and efficient use of new systems.	Leadership and Management
Interview excerpts: - Both immediate and mediate management are fundamental for the implementation of these digital processes because many times we have to deal with this human factor. - Today, with the implementation of our systems, I see that the demand is much higher for us to always be reliable. - Managers have a very important role in this phase of transformation, because any change in structure, system, any change whatsoever, has to start from top to bottom. - They have two jobs, the managers, which is first to make people understand how to use it, bring the whole process from manual to digital, which is a difficult job, and also to overcome their own resistance.	

Table 7: Analysis of impacts from the perspective of non-managers

Source: Original research data

It is noted from the interviewees' statements that the impacts of digital transformation, from the perspective of non-managers, cover different departments of the company, such as operational and financial. The high cost involved, especially due to the development of proprietary systems, and the need for qualified professionals are recurring challenges. Furthermore, the role of leadership is highlighted as essential to guide, incentivize, and ensure adherence to the digital process, being fundamental for the success of digital transformation.

ANALYSIS OF IMPACTS - MANAGERS

For managers, digital transformation is a one-way street, demanding the constant need for business model adaptation. In this pursuit, and for digital transformation to achieve the expected results, strategic alignment among all departments of the Company is necessary, as highlighted by Okano et al. (2019), where Digital Transformation does not truly occur without processes and alignment with the Company's strategy. For this, the role of top leadership in encouraging the use of digital transformation aligned with corporate strategy and the new digital business model is fundamental.

There are employees who do not understand the value of digitalization or resist changes; therefore, these issues must be contemplated in the Company's strategy so that teams are structured that share the Company's vision and objectives. In this context, Alcantara et al. (2024) point out that hiring employees specialized in digital processes and altering the organizational structure with the creation of new roles is fundamental for the success of Digital Transformation.

New employees already arrive with better adaptation to new tools. Furthermore, the training and capacity building of professionals should be considered, so that there is not just dependency on market professionals, in such a way that the strategy needs to include investments in internal training and capacity building, developing the employees themselves who are aligned with the Company's digital strategy.

In the digital strategy, the company's structure with its equipment and technologies needs to be prepared to meet digital transformation, involving investments in robust systems and process automation. The maritime agency's digital strategy focuses on optimizing processes, including the implementation of advanced technologies such as artificial intelligence, which is already revolutionizing how data is managed and analysed.

One of the objectives of the digital strategy is the qualification of effective communication with our stakeholders, which includes charterers, shipowners, terminals, importers, and exporters. Therefore, it is necessary to have efficient communication platforms and data management systems that are well-populated and processed. The quality of data collection and processing is fundamental to ensure that information is accurate and useful for decision-making. Table 8 presents the structure of excerpts and categories that support the understanding of the impacts of Digital Transformation according to the managers interviewed.

Description: Digital Transformation allows access to new markets and the creation of digital services, transforming operations.	Business Model
Interview excerpts: - The impact of this is that it is opening up to the market; when we think about digital transformation, not just of our work, but when we bring digital transformation to the company's strategy, we are opening up to a new market. - You have constant improvements in our market intelligence tools, aiming to make the client's experience better. - Yes, digital transformation can significantly alter the business model, mainly by allowing new digital services and ways of interacting with clients and partners.	
Description: Digital Transformation requires strategic alignment between areas to optimize processes and improve client experience.	Digital Strategy
Interview excerpts: - If the strategy is not aligned with this new business model, seeking this transformation, then conflicts end up occurring. - So I think one of the strategies is to form a team that is moving in the same direction as you; growth is expected when everyone is moving in the same direction. - This includes identifying key areas for digitalization, selecting appropriate technologies, defining processes, and allocating resources for implementation. - These are communication platforms that generate interest from our target audience: charterers, shipowners, terminals, importers, exporters. - Our digital strategy includes all these actions that aim to optimize our internal and external processes, seeking not only optimization but also aiming to create greater value for clients.	
Description: Managers need to be innovative and proactive, promoting digital culture and incentivizing the team.	Leadership Profile
Interview excerpts:	

- A wave of very different professionals than in the past; we have been evolving year after year, investing in these new technologies, tools, and the way of working is very different. - A lot depends on the profile of each manager; if you have a curious manager, an attentive manager who wants to understand, who wants to do things differently, this transformation is very welcome.	

Table 8: Analysis of impacts from the perspective of managers

Source: Original research data

Within the scope of new managers, it is necessary to have restlessness and curiosity regarding possible improvements in existing processes, profoundly altering the profile of managers. With this, an open and innovative mindset is required, where curious and attentive managers are fundamental to leading this transformation. Along these lines, Marquesani (2020) highlights that Digital Transformation has modified the requirements for leadership styles and characteristics, giving rise to the term "digital leadership," defining the aspects of leadership for conducting the Digital Transformation process and maintaining the organization in a digital environment.

CONCLUSION

This study aimed to identify the main challenges and opportunities of the digital transformation process occurring in a maritime agency through the analysis of the experience of the people who promoted and were impacted by this process. To achieve this objective, a qualitative study was adopted, conducted through interviews with actors who witnessed this process.

Among the main results found in the analysis, the opportunity to improve, optimize, and simplify the processes executed by the company was noted, as well as to increase the quality of services provided to clients. This is followed by the difficulties, among which the human factor of adaptation to these processes stands out, as well as the resistance to changing from a manual to a digital culture.

Regarding the impacts, the costs involved in this digital transformation process can be highlighted, including investment in systems, technologies, and training of current employees, as well as the hiring and retention of new talent. Furthermore, a change in the company's strategy is perceived, aligned with a new business model context and the perception of value by clients.

As a suggestion for future research, studies can be developed with the same theme, covering other maritime agencies that are also undergoing this digital transformation process. Finally, another possibility is the study of other players involved in the shipping market, such as port operators, maritime terminals, importers, exporters, and shipowners.

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THE PROFESSION OF THE SHIP AGENT IN 2025 – THE INFLUENTIAL SCOPE OF A QUALIFIED ADVISORY AGENTS WITHIN THE CHARTER-PARTY STRING

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Santos branch: 1958. Wilson Sons' historical records

MV Ocean Energy under discharge in Salvador Port. Wilson Sons' historical records

Tubarao Terminal in 60'S. Wilson Sons' historical records

MV Banbury in 1978. Wilson Sons' historical record

INTRODUCTION

Ship agents play a fundamental and multifaceted role in today's shipping industry. Their responsibilities encompass a broad range of tasks that contribute significantly to the smooth execution of charter party agreements, broader logistics chain as well as Ships's maintenance schedules. As global trade continues to evolve amid growing complexities and uncertainties, the role of the ship agent is increasingly shifting from operational executor to strategic advisor.

Over the past decades, rising global demand for goods and services has intensified the volume and complexity of maritime logistics. Even during major global disruptions—such as the COVID-19 pandemic (2019–2022), the ongoing war between Ukraine and Russia since 2022, and ongoing geopolitical tensions between the United States and China—the shipping industry has demonstrated remarkable resilience. In such turbulent times, ship agents have had to provide smart, adaptive, and professional support throughout the chartering process, aligning their operations with globally recognized best practices and customs.

In the words of DP World Chairman Ahmed Bin Sulayem, as cited by the Institute of Chartered Shipbrokers in *Shipping Business (2020)*:

> *"As one of the original drivers of human civilization and commerce, maritime transport has seen many transformational developments over the ages. From the simple oar to sail and steam engines, to electric and nuclear power, it has been a long journey in search of efficiency and excellence."*

These values -efficiency and excellence- are more relevant than ever in today's maritime landscape. Not many of us, I think, would ever get used to all the infinite possibilities that might be created to facilitate commerce between the countries. Some of them playing a key role are: Sellers and importers, third man players, freight forwarders, business intelligence teams, clearing agents, carriers and NVOCC, regulatory bodies, Flag state Authorities etc. It is clear that all stakeholders are seeking not just routine services, but also streamlined technologies, high standards of compliance, and reliable partners capable of providing insightful, in-depth knowledge and risk mitigation to support the success of their operations.

After nearly two decades in port operations, logistics, freight, and customs brokerage, I can confidently say the maritime industry is heading toward a more dynamic, data-driven, and competitive future. Chartering agreements now involve a wide spectrum of players—exporters, voyage and time charterers, stevedores, brokers, unions, suppliers, and port authorities—each operating under increasingly complex legal and operational frameworks.

According to the *Institute of chartered shipbrokers, Shipping Business 2020 version:*
"The world's merchant fleet still carries 90% of international trade by volume; accounts for more than a third of the value of global trade and generates millions of jobs".

Well, with approximately 90% of global trade by volume still transported by sea, and the maritime industry employing millions and driving over one-third of global trade value, the ship agent must evolve to remain relevant.

In this context, the ship agent's deep knowledge of shipping fundamentals, port procedures, commercial law, civil liability, operational nuances and international regulations becomes not only relevant but essential.

As stated in Module 1 of Introduction to the Shipping World under the section "Challenges for Ship Agents in the 21st Century":

> *"This is a big challenge for the future and should be seen as an opportunity to participate in the ever-demanding world of continuously improving service. You need to know what your principal's needs are—and meet them!"*

THE SHIPPING AGENCY TOWARDS NEW MARKET TRENDS

I should begin this topic by saying that there is a diversified range of shipping agency scopes totally subject to Principals' needs, that could vary from Port Agents, acting on behalf of Charterers, Owners, Sellers or Receivers, until Liner Agents, Protecting Agents, Husbandry Agents and Advisory Agents (last one might be deemed as overall scope and covering all possible jobs and qualifications).

However, the way of doing business nowadays has a "new" factor which has been notoriously present in commercial activities: Market intelligence.

For Mr Marcelo Neri, President of national agencies (FENAMAR): "the Shipping Agent is not only a vital link acting with the players within the foreign trade, but also as an "Intelligence arm", ranging from the anticipation of vessel berthing to documentation procedures, and from the optimization of port dwell time to comprehensive data management, these measures exert a direct influence on the national competitiveness of our products".

https://www.atribuna.com.br/opiniao/de-popa-a-proa/agente-maritimo-uma-engrenagem-de-inteligencia-1.460939

Yet at this reasoning, Mr Renan Queiroz, Commercial Manager in Wilson Sons Shipping Services, mentioned that:

"In the past, many industry players capitalized on the lack of port data — with traders exploiting competitors' limited access to information or even requesting that their own data would not be disclosed. In today's world, however, information about cargo inputs and outputs and the stakeholders involved has become much more accessible.

Traditionally, Shipping Agents have played a key role in providing clients with market statistics to support a better understanding of local dynamics. In the current landscape, this role has become even more critical.

Shipping agencies are increasingly investing in information technology and leveraging their presence at key operational points. The daily vessel line-ups they produce are transformed into

valuable datasets, which are widely utilized by various market participants, including shipowners, charterers, traders, and brokers.

In this evolving context, the Agencies are also emerging as a data-driven service provider. For those leading this transformation, the ability to deliver reliable, well-structured, and actionable data offers a significant competitive edge — particularly when presented to clients in a clear and accessible manner."

Upon illustrating the intelligence market trend and suggesting its importance, I might say it is not the main thing in its core activity. More than that, Ship Agencies are always looking to set a smarter and trustful environment, right in line with their Customers' needs, aiming to provide in-depth information about Vessels movements, cargo readiness, Port updates and qualified behaviour during normal or critical situations.

PROFESSIONAL BACKGROUND: UNDERSTANDING THE RELATIONSHIP WITH PRINCIPALS

In a nutshell, as highlighted by ASBA in Ship Agency Handbook, international edition: "Agency is the name given to the legal relationship which arises when two or more parties enter into an agreement, whereby one of the parties, called the agent, agrees to represent or act for the other, called the principal, subject to the principal's right to control the Agent's conduct concerning the matters entrusted to him. Anything a principal is empowered to do may be assigned to a ship agent who then performs the designated acts on behalf of the principal. A fiduciary relationship exists between the agent and his principal. This is a relationship whereby the principal entrusts the agent to protect the principal's interests". On the other hand, Principals have the following types of identity:

- ➔ In a disclosed principal scenario, the principal's identity is known to the third party during the agent's transaction.
- ➔ The disclosed principal is bound to and responsible for contracts made by an authorized agent on their behalf.
- ➔ In a partly-disclosed principal scenario, the principal's identity is not revealed, although the third party is aware that a principal exists.
- ➔ Both the partly-disclosed principal and the agent can be held liable in a partly-disclosed scenario, unless agreed otherwise.
- ➔ For example, a shipper might request an agent to obtain stevedore costs without revealing their identity to prevent information sharing.
- ➔ Agents should consistently inform service providers that they are acting on behalf of a principal.

THE UNDISCLOSED PRINCIPAL

➔ An undisclosed principal's existence is unknown to the third party at the time of a transaction and is not bound by the agent's agreements. When an agent doesn't disclose whom, they're acting for, the agent is liable to the third party. The undisclosed principal cannot be sued for non-performance. To avoid liability, agents should disclose they are acting as an agent and the principal's identity.

This type of disclosure may operate as a safeguard for the agent against direct liability to third parties arising from contracts executed on the principal's behalf.

FOUR TYPES OF PORT CALLS: HOW SHOULD THE AGENTS ADDRESS SAFE PERFORMANCE

The commercial players, by contrast, face problems which, though they have their theoretical angle, are essentially practical-problems like "which-way-to-go" and "how-to-make-it" type, problems which call not merely for comprehension but for decision and action too. Understanding these players' needs is thus one of key points that shall be deemed to by a wise and sophisticated Agency desk. Behind all these scopes, below we will briefly look into each of them as follows:

➔ Charterers' Agents**:** appointed by a Disponent Owner (Carrier), in line with Charter-party contents, being deemed to tender the Vessel on behalf of a domestic or foreign Carrier for commercial purposes (cargo loading / unloading or transshipment). Despite being acting for an Owner, Agents often work for the Voyage Charterer, which generally might be a cargo seller, when a sales contract refers to a CFR, CIF or group D (see Incoterms 2020 or some oldest version) or a cargo buyer / trading company when a sales contract refers to FOB condition, looking after Charterers interests and satisfaction, therefore affording being selected by a cargo Charterer. This type of Agency appointment is more commonly observed in commodities fields, like: agricultural products, iron ore, fertilizers, minerals etc.

➔ Owners' Agents: appointed by a Disponent Owner (Carriers), this kind of appointment is very subject to charter-base or booking note agreement, also considering some specific kind of cargoes like: break-bulk, neo-bulk, project cargo, RO-RO, containers, forest products, and others. Agents, on this scope, will solely work to Owners and their best interests, which are, mainly to arrive in a customary port area, berthing, loading or unloading the goods, and sailing in a quicker way. Generally, either Sellers or Buyers agree with the condition of Agents nomination coming from Owners, which also reflects a big portion of Owners responsibility and risks, taking into account the freight does not apply demurrage nor despatch terms (see indefinite laytime section). Such conditions supposedly give more control to Owners.

➔ Protective Agents: appointed by whoever is in need to be represented by a local Agent during said port call. This particular Agent might act to fulfil detailed or more subtle scopes as:
- husbandry matters to a manning department or ship manager;

- attending a distress call to a Ship containing a sick seafarer who needs a first-response doctor assistance;
- renew a compulsory certificate;
- provide Principals with official supporting documents related to port expenses;
- screening the Port Agents' "Disbursement Account";

➔ Advisory Agents: also appointed by whoever is in needs,
- represent Owners before a Port Captaincy' detective inquiry;
- investigate the work of a "Port Agent" on behalf of an Owner or Charterer;
- instruct the Principals regarding legal matters, such as demurrage issues, misleading SOF (Statement of facts), mishandling and misunderstandings from Authorities, Brokers, Port Operators, customs brokers etc and how to anticipate and avoid such conflicts;
- take care of correct SOF insertion like: rainy periods, Ships cranes stoppages, draft survey and others;
- Vessels' arrest;
- Letters of protest and how to defend from them;
- conflicting issues regarding method of cargo ascertainment;
- Vessels over drafted;
- Vessels with deficiencies stated by Master;
- Dry dock for maintenance;
- Regulatory sides from Ports and Union bodies; How they affect Principals;

➔ Hub Agents: Agents with global coverage and background designed for a specific niche (for instance, Inchcape Shipping Services with their own offices in every country and corner, specialized in liquid bulk calls).

According to ASBA in Ship Agency Handbook, international edition:
"A hub agent is similar to a general agent. The hub agent is under contract to the principal. The hub is a third-party service that the principal uses for outsourcing disbursement account management, port cost analysis, agency networking and supervision, document storage and communication systems. The hub agent may have offices worldwide or be contracted for a specific geographic area".

SHIPMENTS CHARACTERISTICS

Before we start to ascend our mountain of knowledge applied to the industry's needs, we need to stop and ask ourselves a very fundamental question - a question, indeed, that Agents or brokers always ought to put in place whenever a business is close to being materialized or even after an official appointment has reached your email. This question, in my humble opinion, concerns and drives the Agents' motives and intentions like: What is my ultimate aim in assisting the customer to reach a profitable business? What do the Agents know (in detail) about the particularities (legal minutia) of their contract, cargo and selected Port?

GOING THROUGH THE MAIN TERMS AND PROFORMA CHARTER-PARTY

The very greatness of the subject matter will place the Agents in an important position, understanding the cargo, port and contract points in detail.

First off, undersigned shall make reference to the existing (magnificent) work of BIMCO for the maritime industry since 1902.
BIMCO, Baltic and International Maritime Council, as per Clarkson's:

"The main purpose of BIMCO is to foster standardisation, transparency and professionalism across the global maritime industry. The organisation plays a key role in supporting smooth international trade by offering a framework for fair and efficient shipping transactions".

There are a diversified number of Charter-party specimens in the Internet, also in some platforms such as Scribd, so let's take a look at some of them.

NAME	VERSION	MAIN CHARACTERISTICS	GROUP
Gencon General condition	1994 / 2022	FIOS, SHEX, separate laytime, berth C/P, however in case a free berth is not offered when Vessel reaches port customary area, NOR shall be given within ordinary hours. Agents often nominated by Owners.	Break bulk and bulky cargoes.
Ferticon	2007	More flexible as to NOR and laytime rules, however NOR standard is SHINC. Agents often nominated by Voyage Charterers. Establishes reasonable standards for holds cleanliness. FIOST or FIOS LSD terms applied. Draft survey is the official method of cargo ascertainment. Loading agreed and commenced after the laydays period shall count as half laytime. Laytime at both loading and discharging ports shall commence only after 24 hours of NOR tendering.	Fertilizers
Sugar Charter-party	1997	1 or 2 safe ports. 1 or 2 safe berths. Stevedores FIOST Agents to be selected by Voyage Charterers. Charterers have the right to perform holds survey and hose test before the loading commencement. Ship to provide and lay sufficient dunnage and mats or kraft paper at its own costs. Possibility to use one hold / hatch exceeding more than 15 metres length and work as 2 gangs simultaneously with 2 Ship's gears.	Sugar
COA Iron ore pellets	N/A	Gearless single deck bulk carriers	Iron ore

Rider to Gencon C/P		maximum 18 years. Cargo nomination as per Charterers. Variation MOLOO. SHINC. WWWW ATDN	
Conline booking	2000	Loading and discharging port(s) and berth(s) are indicated by the Merchant, but arranged by Carriers. Consignee(s) shall load / discharge as fast as the Vessel can load or receive such cargo. Stowage as per Carriers instructions. Stevedores costs are flexible. It may be on the Carriers account, included in freight base.	Project / neo-bulk
Graincon	2016	Stevedores are FIOS spout trimmed. Cargo trimming, if additionally required, shall be at Master account. Fumigation at Charterers account. Berth charter-party. SHEX UU IUATUTC	Grains

MAIN TERMS

To focus this point further, allow me to introduce three things:
1. Main terms are the backbone of a Charter-party.
2. During the lifting of “subs”, there are 2 specialized professionals with a background in *Chartering:* A cargo broker and a Ship broker.
3. All negotiation stages shall be based on 3 pillars: ethics, communication and credibility.

First steps: When a cargo *Seller* is negotiating potential sales with its *Buyer,* they look to mutually investigate what is the best transportation type, shipment target dates, FOB + CFR (or CIF) prices, carriage-freight cost, ports of loading and discharging, along with the customary loading and discharging rates, then who will be responsible to take after freight as a Voyage Charterer and who will be “free of bother”. Once each role, and each party is made aware of, it is time to exchange proposals in order to fit in each goal.

Upon some rounds of offers, counter-offers and recap, we might see a fixture example containing a brief description of the main terms. Such fixture comes only through some prior acquaintance from Principals.

MAIN TERMS EXAMPLE AT C/P USING SHINC CONDITIONS:

QUOTE
CARGO: FULL CARGO OF 49,000 MT OF STEEL SLABS 5 PCT LESS UP TO MAX INTAKE OF THE VESSEL IN CHARTERERS OPTION.
VESSEL MAX ESTIMATE SHOULD BE AROUND 47,500~47,700TONS BSS 37 FEET SW (CHECKING WITH MASTER).
PORT OF LOADING: 1 SPSB MUCURIPE, BRASIL
LOADING RATE: 10,000 SHINC BSS 3 AVAILABLE HOLDS/ 3 AVAILABLE HATCHES / 3 AVAILABLE CRANES.
PORTS OF DISCHARGE: 1 SPSB ALTAMIRA, MEXICO
DISCHARGE RATE: 16,000 SHINC BSS 4 AVAILABLE HOLDS / 4 AVAILABLE HATCHES / 4 AVAILABLE CRANES
TAXES: OWNER SHALL BEAR ALL OFF-SHORE INFRASTRUCTURE RELATED COSTS SUCH AS INFRAMAR, CHANNEL FEES AND ALL SERVICE RELATED COSTS SUCH AS PILOT DUES, TUG BOATS AND AGENCY COSTS.
NOR AT LOAD POART: NOTICE OF READINESS MAY BE TENDERED UPON ARRIVAL OF THE VESSEL AT LOADING PORT AT ANY TIME DURING THE DAY OR NIGHT, SUNDAYS AND HOLIDAYS INCLUDED, WHETHER IN BERTH OR NOT, WHETHER IN FREE PRATIQUE OR NOT, WHETHER CUSTOMS CLEARED OR NOT, PROVIDED THE VESSEL IS IN ALL RESPECTS READY TO LOAD THE CARGO.
UNQUOTE

MAIN TERMS EXAMPLE AT C/P USING SHINC:

+++ QUOTE +++
- CARGO: FULL AND COMPLETE CARGO OF 7.500 MTONS OF BAGGED FOODSTUFF (SPAGUETTI, CORNFLOUR, VEGETABLE CREAM) IN BIG BAGS DIMENSION 1,10 X 1,10 X 1X5) – MAX 7 TIERS HIGH
SPAGUETTI - 1.091 MTONS BIG BAGS OF 1.100 KG EACH
CORNFLOUR - 6.300 MTONS BIG BAGS OF 1,000 KG EACH
VEGETABLE CREAM- 105 MTONS BIG BAGS OF 480 KG EACH
- POL: 1 GSP GSB AAAA RIO GRANDE
- POD: 1 GSP GSB AAAA GUARANAO, VENEZUELA
- OWNERS TO ASCERTAIN PORT RESTRICTION BOTH END
- LAYCAN: JUNE 28TH-JULY 10TH
- TERMS: FIOS/L/S/D
- LOADING TIME: 1.800T WWDAY SHINC
- NOR CAN BE TENDERED ATDNSHINC BENDS – 12 TURN TIME
-TAXES A/O DUES ON CARGO TO BE FOR CHRTRS ACCT INCLUDING ANY CARGO THROUGHPUT CHARGES
-ANY/ALL TAXES/DUES/FEES/CHARGES/WHARFAGES/TALLY/ETC CALCULATED ON CARGO AND/OR FREIGHT TO BE FOR CHARTERER'S ACCOUNT INCL PUT AND MMR.
-DAILY MATES RECEIPTS TO BE ISSUED FOR THE QUANTITY LOADED ON BOARD IN THE LAST PERIOD
-MASTER ONLY TO ACCEPT SOUND/CLEAN CARGO / DAMAGED CARGO TO BE REPLACED BY CHRTS AT THEIR OWN COST AND TIME
- " VESSEL TO PRESENT AT LOAD PORT WITH CLEAN SWEPT HOLDS AND ALSO ALL RESIDUES FROM PREVIOUS CARGOES TO BE REMOVED FROM HATCHES AND HOLDS, INCLUDING OVERHEAD BEAMS.

UNQUOTE

During the fixture recap, Agents have a key objective that is providing the technical analysis of the candidate Vessel offered by Ship Brokers or the performing Owners. It has been something worthwhile in a way to validate the Vessel and its feasibility to berth and operate the intended cargoes at loading and discharging ports.
A few hours may be required by Traders and their brokers to Agents revert with written confirmation for such approval or non-approval with reason.

Final steps: Although I think the above terms and examples must be well known by our industry, my aim also seeks to identify opportunities to clear up the mind of those who never were involved in Chartering and Port practices. Therefore, from another standpoint, we have not yet said very much about shipbroking and its interrelationship with logistics and Ports.

Said that, some *Charter-parties* have some incorporated addendum - appendix containing rider clauses or important loading rules for which the Owners and brokers shall be familiar with.

See a sample as follows:

Owner shall provide adequate vessels suitable for loading at Shipper's loading facilities. In this connection, Shipper indicates that the acceptable maximum dimensions for vessels loading at its piers at Ports are as follows:

Port of Tubarão:

Item	Pier 1 South	Pier 1 North	Pier 2
DWT Maximum	170.000 mt	210.000 mt	405.000 mt
LOA Maximum	285,00 m	301,00 m (LOP1) 320,00 m (LOP2)	365,00 m
Beam Maximum	43,50 m	51,00 m	66,00 m
Depth alongside	17,00 m	18,00 m	25,30 m
Draft alongside	16,00 m (LOP1) 13,00 m (LOP2)	17,00 m + 80% high tide(LOP	23,00 m final sailing draft subject to height of

** Iron ore at Tubarao Port*

LAYTIME: HOW TO PROMOTE MORE EFFICIENT PORT CALLS

It is clear, to start with, that “knowing” Principals’ proforma Charter-party or the main terms is of necessity a more complex business than “knowing” the basics of the region where the shipment will be performed at.

In these few sentences we have said a very great deal. Our point here is to explore the details of sales contract and charter-party, endeavouring to significantly reduce the costs of the port call, potentially bringing them down to zero.

According to Mr. William V Packard, in “Laytime Calculating” from 1978: “Laytime can be simply defined as the time available to a charterer for a voyage-chartered ship’s cargo operations. By its nature laytime can only apply to voyage-chartered vessels and not to ships under demise (bareboat charter-party) or time-charter. If the available laytime is exceeded, the charterer has to pay liquidated damages, usually in the form of demurrage money, to the ship-owner. On the other hand, it is often agreed that if the available laytime is not fully used, the charterer is rewarded for time so saved by payment of despatch money from the ship-owner”.
In Coracle - dry bulk chartering course, laytime can be defined as:
“Laytime is the time permitted in a contract for loading and/or discharging a voyage-chartered ship. If this permitted time is exceeded, the owner or operator of the ship is entitled to damages. These damages are normally agreed to be liquidated, that is, a daily sum (or *pro rata* for part of a day) will be negotiated in the form of demurrage, payable for each day or part day of delay.
The demurrage rate is usually freely negotiated by the parties concerned during the fixing stage and will reflect market conditions prevailing then. Matters can change during the course of the voyage, but under most charter parties the rate of demurrage will not alter. Some charter parties restrict the period in which the demurrage rate applies. If the vessel is still delayed beyond this period, the owner can claim damages for detention instead of demurrage”.

This is the reason the fixture recap is so important to the chain, where sensitive items such as demurrage, despatch, duties with loading rate etc are so deeply discussed.

Mr William V Packard also said: “However, this basically straightforward statement can become a battleground, wherein charter-party clauses are interpreted in different ways with regard to exactly what time is available for loading or discharging or, alternatively, when laytime commences, is interrupted or ceases”.

The calculation of laytime can be divided into seven stages:

1. Read the relevant clauses in the governing contract
2. Obtain the “Statement of facts”.
3. Determine how much laytime is available, i.e. its duration.
4. Establish the commencement of laytime.
5. Allow for interruptions to laytime.
6. Establish when laytime will cease, i.e. Cessation, and
7. Calculate how much Despatch or Demurrage is payable.

WHAT DOES INVOLVE THE EFFICIENCY OF A “COMMERCIAL PORT CALL”?

Imagine, now, that you work for a Ship Agency specialized in agricultural products. Your principal is a global Trader with more than 10 million produced and traded yearly towards Brazil and Argentina to China. You shall give them reasonable and proactive performance by anticipating all relevant events and placing them in advice for any Owners misbehaviour, fake NOR tendering, holds unfit to load grains, or even avoid the FOB-Sellers from making wrong decisions as to the maximum contractual cargo intake, goods quality, or shipment bypass.

It is of paramount importance understanding the basics of demurrage and how it affects the day-to-day business profit, as previously mentioned. Below, we’re going to move forward a couple of messages exchange from undersigned in line with my principals’ inquiry:

Quote

HI SIR / THOMAS

WELL NOTED ABT JOB SCOPE.
USTAND WE SHOULD DAILY CHECK ABT PORT LOG EVENTS, IF THEY ADD UP B/W PORT AGENTS X MASTER RECORDS, AS WELL AS REGARDING RAIN LOG SINCE ARRIVAL UP TO DISCHOPS COMPLETION.
TRUST IT IS DOABLE ON OUR SIDE, HOWEVER SUB TO MASTER'S DAILY SENDING FOR OUR SCRUTINY, AS THE EVENTS ARE DISCLOSED BY THE PORT OPERATOR ONLY, IN A CONFIDENTIAL N PRIVATE SYSTEM.

IF SUITS YOU, KINDLY BRIEF US ASF:
- MAIN TERMS SHOWING WHATEVER RELEVANT TERMS AS TO AGREEMENT / RULES FOR LAYTIME COMMENCEMENT, INTERRUPTIONS, CESSATION, SHIFTINGS, BAD WEATHER ETC
- IS REQUIRED AGENTS BOARDING VISIT TO MONITOR CARGO DOX SIGNATURE IN THE END ?

PLSD TO HEAR
THANKS & BRGDS
THOMAS SILVA

UNQUOTE

Some items to point out:

- ➔ Agents shall have a clear picture of the job scope required.
- ➔ If the main terms can be disclosed or shall be kept private and confidential (P&C).

QUOTE

Dear Thomas,

Gd day,

My colleque Ismail is at summer vacation fr 2/3 days.

Ref to yr blw, pls note fllwngs:

Ref.: M/V [redacted] – [redacted] COMMERCIAL QUAY

ATA 02-Aug-2024 at 02:50hs
NOR 02-Aug-2024 at 04:15hs
PROSPECTS AGW WP - COMMERCIAL TERMINAL - 201

- ETB 21-Aug-2024
- ETC 25-Aug-2024

++

-We have no further dispute with chrts regarding bad weather periods, anymore but may prfer to keep eye on her locally to avoid any wrong action against vsl/owner/crew.

M/V[redacted]
28.189 DWT ON 9,819 MTR SWD - BLT AUG 2010 (JAPAN)-TURKISH FLAG
SINGLE DECK - BULK CARRIER – CALL SIGN: TCYZ9 - IMO NO: [redacted]
LOA/LBP/BM/DM 169,37/160,40/27,20/13.60 MTR - GRT/NRT 17.025/10.108
5 HOLDS / 5 HATCHES – 4 X 30.5 MTN CRANES-CO2 FITTED
TPC: 39,60 MTN-TYPE OF HA/COVERS: IWAKITEC – FOLDING HYDROLIC TYPE
TOTAL GR/BL CAP: 1.317.978 / 1.262.258 CBFT
ALL ABT WOG

-ACCT [redacted]
-Disc terms: 5000 MTS PWWD SHINC - 12 HOURS TURN TIME BENDS
- NOR TO BE TENDERED BSS WWWW AT ANY TIME DAY OR NIGHT AT SHINC BSS 7/24 AND TURN TIME COMMENCE COUNT UPON MASTER TENDER NOR.
-SHIFTING IF ANY FM WAITING/LAYBY PLACE TO 1ST LOAD/DISCH BERTH, TO BE FR OWS ACCT AND TIME NOT TO COUNT BE. SHIFTING BETWEEN 1ST AND 2ND LOAD/DISCH BERTHS TO BE FOR CHRTS/SHIPPERS/RCVRS ACCT AND TIME TO COUNT ASPER C/P TERMS BE.
-AT BENDS, CHRT HAS 4 CONS HRS AS GRATIS PERIOD FR CUSTOM CLEARED CGO DOCS OWISE TIME TO COUNT AS L/T OR TIME ON DEM UNTIL CUSTOM CLEARED DOCS ARRIVE ON BOARD. IT IS CLEAR THAT SUCH GRATIS PERIOD SHALL COMMENCE TO COUNT ONLY AFTER COMPLETION OF LOADING & DISCHARGING OPERATIONS.
-ONCE ON DEMURRAGE ALWAYS ON DEMURRAGE BENDS
-IF VESSEL IS REQUIRED TO LEAVE THE BERTH(S) DUE TO PORT AUTHORITY'S DEMAND, ALL EXPENSES ON ACCOUNT OF OWNERS ARISING FROM SUCH EVENT TO BE FOR THE ACCOUNT OF CHARTERERS AND TIME TO COUNT FULLY AS LAYTIME AND/OR DEMURRAGE AS THE CASE MAY BE
-Chrts/rcvrs Agent at SFDS: [redacted]
-AT DISCH PORT, GRABS TO BE SUPPLIED+PROVIDED BY RCVRS/CHRTS AT THEIR TIME AND ACCNT

Cgo manifest and draft SOF is as attached

++

So, enable us to appoint you as owner's protecting Agent, will much appreciate to see your quotation.

Tks in adv

UNQUOTE

We can fully realize that the above request means an “Advisory Agent scope” before the Customer, which requires a deep knowledge of local port customs, practices, and also a correct interpretation of the conveyed main terms.
Upon being selected as “Advisory Agents” by the performing Owners, also known the full job scope, a daily follow-up report, together with Port Captaincy’s notice regarding “bar closure/reopening” and other Ship’s SOF were sent to Principals, covering all berths located at the Public Port and vicinity areas, aiming to prevent the Receivers’ Agents to make bad use of rainy periods into their SOF by placing the Principals in jeopardy due to excessive and senseless rainy logs (“Rain” is always problematic to Owners’ end):

QUOTE

Dear [redacted] good day!

In connection with our last, kindly note below my comments as to the draft SOF.

Bad weather due to dense fog issues
==========

1/ Kindly note enclosed the "official statement" from Port Captaincy as to "Bar closure from 05th 2100lt up to reopening on 7th 0740lt".
2/ On Aug 3rd from 2200 to 2400 > poor visibility due to "fog issue" impacted on sailing maneuver from MV [redacted] from Berth#102. No impact at cargo operations while the designated Berth #201 was busy to MV Quetzal Arrow.
3/ On Aug 4th from 0000 to 2400 > poor visibility due to "fog issue". There were no maneuvers performed. No impact at cargo operations while the designated Berth #201 was busy to MV [redacted]
4/ On Aug 5th from 0000 to 1900 > poor visibility due to "fog issue". No impact at cargo operations while the designated Berth #201 was busy to MV [redacted]
From 1900 to 2100 > It was performed the Berthing maneuver of MV [redacted] on Berth #101. Also the Shifting of MV [redacted] from #102 to #201 (designated Berth).
It was officially declared the "bar closure" on Aug 5th as from 2100lt onwards.
5/ On Aug 6th from 0000 to 2400 > poor visibility due to "fog issue". Neither cargo operations nor IN / OUT maneuvers performed at designated Berth #201.
6/ On Aug 7th from 0000 to 0740 > poor visibility due to "fog issue". Neither cargo operations nor IN / OUT maneuvers performed at designated Berth #201.
Rainy periods
==========
Have double-checked the Port Agents records included into draft SOF and it is less than MV [redacted] rain records (see attached). * MV [redacted] was berthed from 08th until 10tham on designated berth #201.

Pse instruct if any action our side.
Last but not least, above "dense fog" itemized comments might serve as my remarks to be deemed into the final version of Sof thru Master comments by written or Master's letter to be fully incorporated as part of SOF, if suits you.
Thanks & brgds

UNQUOTE

CASE CONCLUSION

Dear Thomas,

Gd mrng,

I was at summer holiday and just came back.

We wld like to thank for your excellent & fruitfull assistance and back up which is really very much appreciated.

Your existence helped us so much to reach a mutual agreement with chrts.

We thank you for your professional guidance and support.

All the best for you and for your team !

Best Regards,

VESSELS FIXED WITH INDEFINITE LAYTIME

There are also “Hatch” calculations which are more complicated than tonnage calculations, but occasionally need to be performed.
And also, there is indefinite laytime, when occasionally, a performing Owner agrees for his Ship to be loaded or discharged as per Custom of the Port (COP), Customary Despatch (CD), Customary Quick Despatch (CQD), or Fast as Can (FAC) terms.

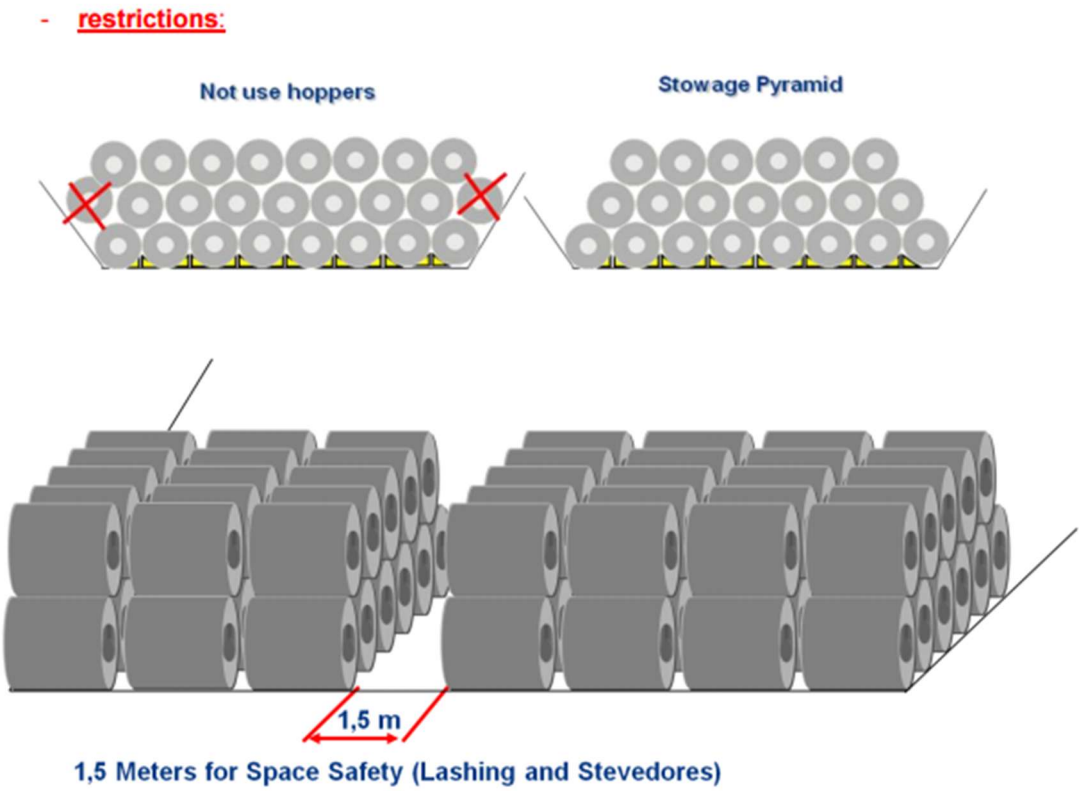
It can be stated that a freight arrangement without defined loading/discharging rates or a fixed demurrage rate entails a high level of risk.

By choosing this option, Carriers will bear all the expenses and time losses while the Vessel is kept at off port limits or inside a Harbor intermediate anchorage.

Agents shall therefore be in a position to recommend to Owners some relevant details as follows:

- ➔ deploying a Supercargo or Port Captain to oversee and speed up the cargo operations

➔ a qualified and independent Marine Surveyor to perform out-turn survey and tally
➔ deploy additional gangs and shore equipment etc.



Source: guidelines for steels loading. Gerdau

Shore forklift being lifted onto holds to handle light and heavy coils in Sao Francisco do Sul, Brazil.

Handling of steel coils in Sao Francisco do Sul Port, Brazil.

Manual spread-bar discharging steel coils onto trucks alongside. Sao Francisco do Sul Port, Brazil.

SUNDAYS AND HOLIDAYS AT DEFINITE LAYTIME CORE

When a Charterer, Seller or Receiver is looking to fix a laytime, first thing in mind should be discussing this relevant theme, if you wish to avoid a heartbreak feeling.

According to BIMCO, Holiday legislation is reflected at national, regional and municipality level. Hence, all precautions should be taken by Charterers and Time-Charterers when dealing to bind a complete Charter-Party.
Sometimes, if a Shipper or Receiver wants to work during a Holiday, Stevedores will only offer their services under a "premium rate", considering that the Port would be idle during said period. Also, Holiday portion of time is often not computed at laytime calculation, unless otherwise not agreed or if already in demurrage.
According to Mr William V Packard:
"A charterer has no intention of incurring expense for a ship lying idle during weekends and holidays if he can avoid doing so, and normally there will be an express clause in a charter-party to the effect that Sundays and holidays are not to count as Laydays. In non-Christian countries where Sundays may be normal working days, it is usually agreed that Fridays and Holidays will not count as Laydays".

He complements:
"Furthermore, the charter-party will normally specify the actual time before a holiday or a Sunday that laytime is to cease. It may well be that time after noon on a Saturday, or on the day preceding a holiday, is not to count as laytime. Similarly, the charter-party will normally specify the actual time after a holiday or a Sunday that laytime is to restart. It may state, for example, that time will not count as laytime until 0700 hours on the day immediately after a holiday or a Sunday, at the time the port labour resumes normal working. If no specific times is laid down in the charter-party, laytime would generally continue until midnight on the day preceding a holiday or a Sunday, recommencing at 0001 hours on the day immediately following the interruption".

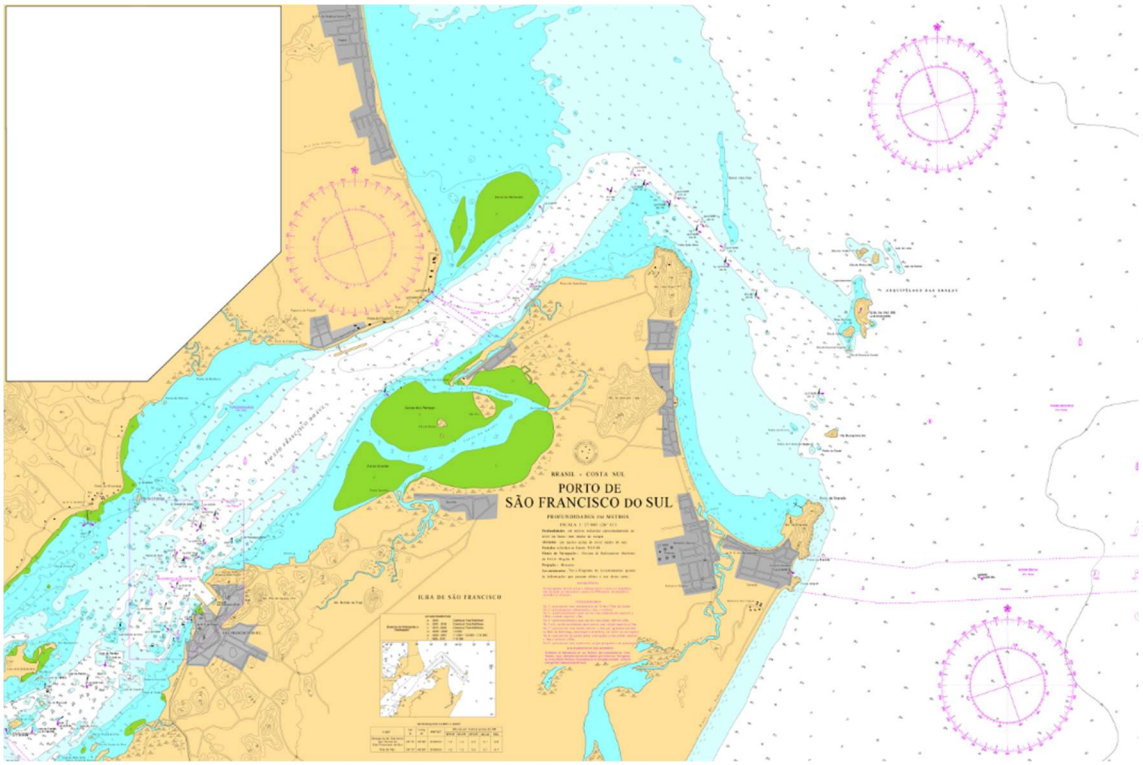
N.B: We must remember the golden rule: "Once in demurrage, always in demurrage".

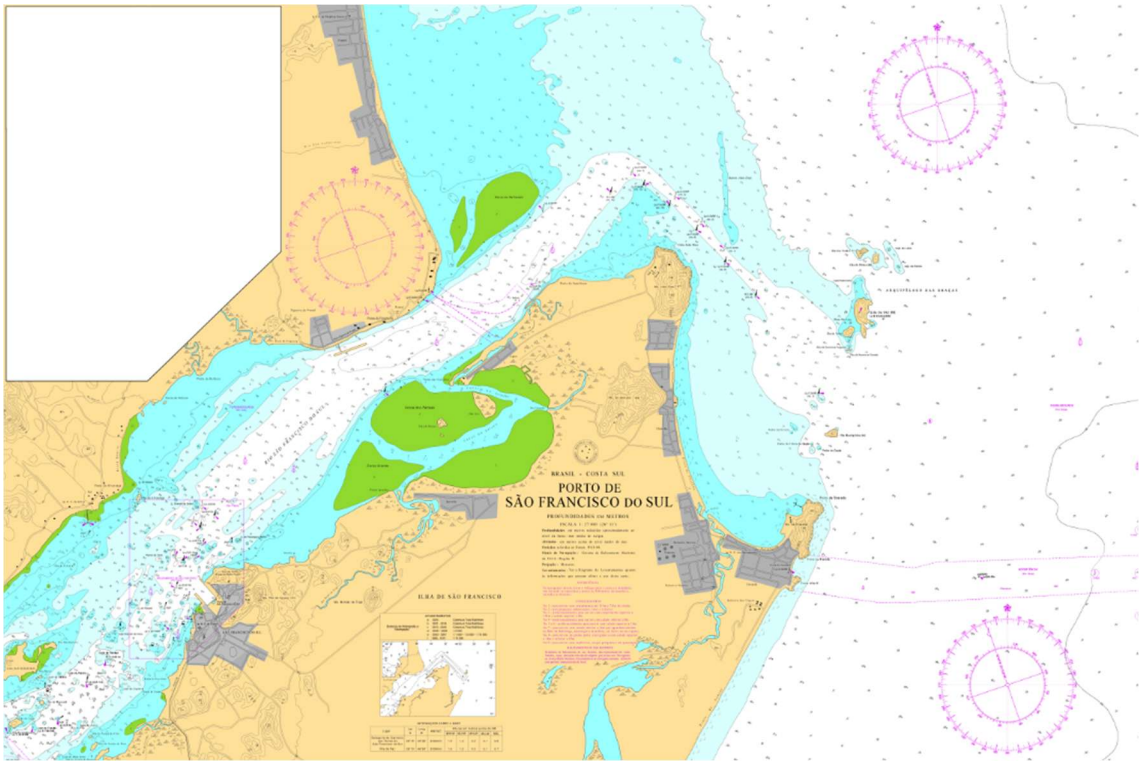
Also important to highlight the article from PANDI Insurer Steamship Mutual:
https://www.steamshipmutual.com/publications/articles/articles/notice_readiness_1

Laytime definitions - 2013:
https://www.bimco.org/contractual-affairs/bimco-contracts/contracts/laytime-definitions-for-charter-parties-2013/

Laytime + E-SOF platform:
https://www.englare.com/laytime

FIVE UNDERSTANDING THE RELEVANT CUSTOMS FROM NOMINATED PORT(S) AND ITS MAIN RESTRICTIONS





Port of Sao Francisco, at Santa Catarina state. Source: Harbor Master - Brazilian Navy.

Port restrictions are critical factors affecting the efficiency of a port call. Also, the non-compliance of said restrictions can place Owners or Charterers in a very critical condition.

Some key elements Agents and Brokers shall take care of:

- ➔ Make sure to report to the involved chain the latest versions of Port handbook, reflecting the Port features as: maximum draft, dynamic draft considering “squat” effect calculations, average tidal range, provisions established by Pilotage and Port Captaincy, e.g.: appliance of additional under keel clearance.
- ➔ Endeavour to always report to Principals, the last bathymetry schedule given by Port Authority, and the possibility of restrictions review in port canal, anchorage, intermediate anchorage, berths, lay-by berths etc.

DE-BALLASTING OPERATIONS

In some cases, the Ship’s pump out flow (de-ballast) does not fit in the Terminal’s loader capacity per hour. Agents shall observe the following points:

- ➔ all stoppages and/or ship loader limitations imposed by this fact shall be reflected at SOF, enabling Shippers / Principals to exclude said timing from laytime, as the case may be.
- ➔ make sure to refuse Ship Master’s Dead-freight letter in case Master alleges that the Terminal did not provide the required cargo tonnage, in case the reason was clearly caused by Ships’ technical fault.

➔ Always ask Principals if a Letter of Protest shall be issued against Owners for non-compliance of the proposed stowage plan produced by Owners.

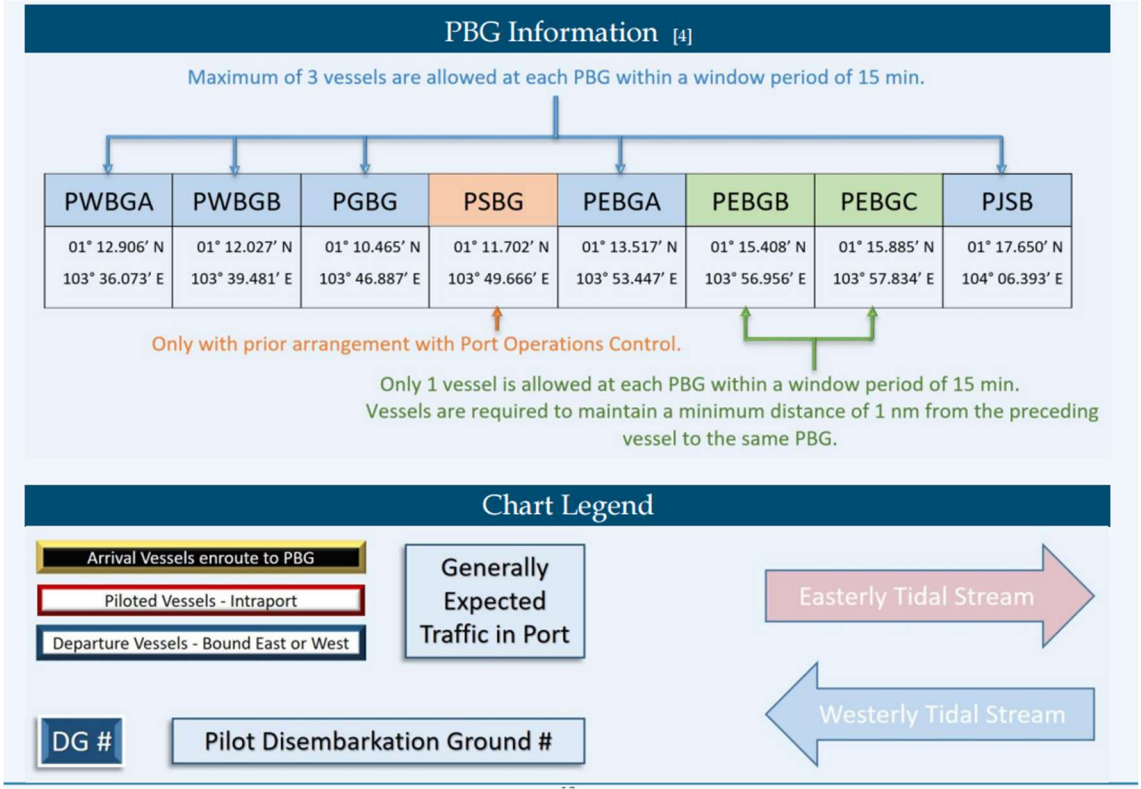
Some rider clauses might be worked to prevent unwanted discussions about this point. See below my suggestion:

Vessel must ballast simultaneously to loading operation within required time, according to her age/specifications. Owners will instruct the Master to minimize de-ballasting time in order to avoid stoppages during loading. Nevertheless, Charterers / Shippers shall not be entitled to reject any nomination due to vessel not

being able to de-ballast at the speed required by the loading terminal.

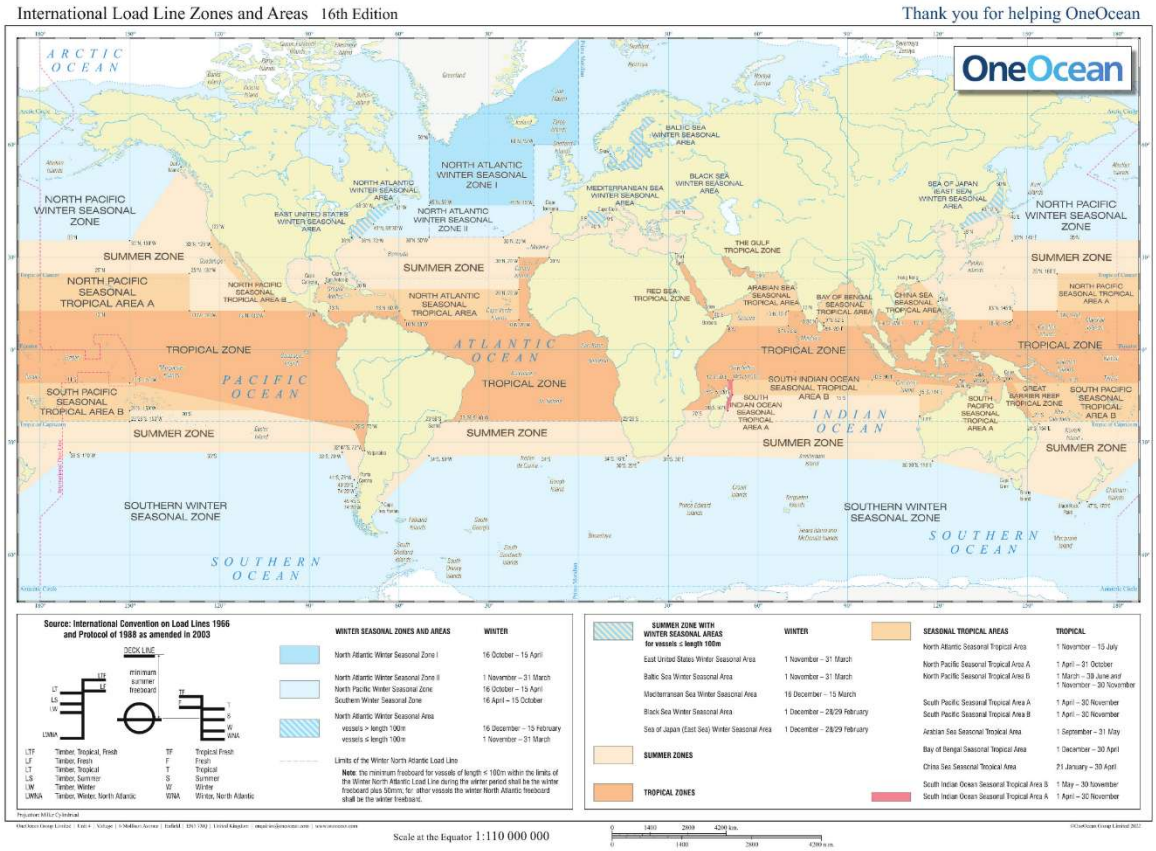
Sometimes, some private Terminals disclose such information into their Port Handbooks as well. See below sample from VLI - Tiplam Terminal in Santos:

https://www.vli-logistica.com.br/wp-content/uploads/2022/09/SAFETY-AND-OPERATIONAL-PORT-GUIDE_-01-VIA-07-06-19-003.pdf

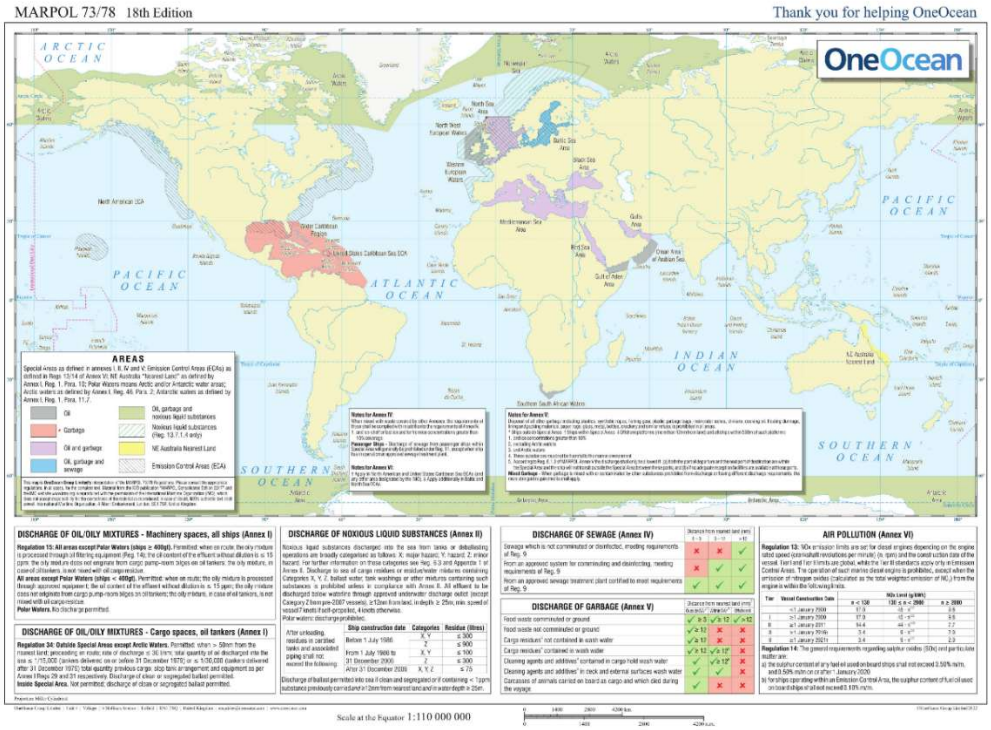


Source: Port guidelines from Singapore Pilots Services department.

Source: Port guidelines from Singapore Pilots Services department.



Source: One Ocean / Load lines map.

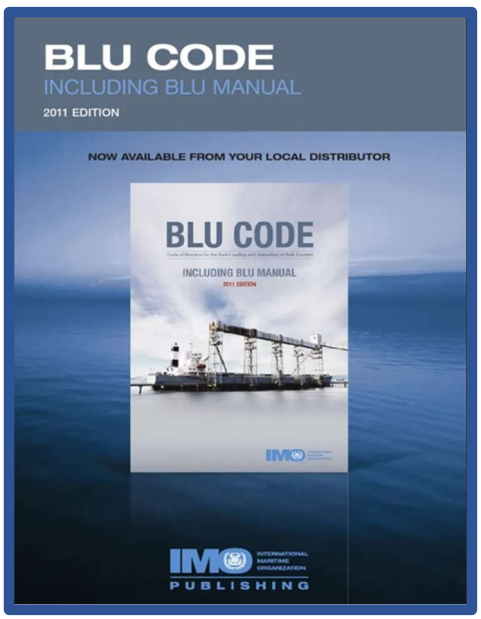


Source: One Ocean. MARPOL 73/78

KEY FACTORS AFFECTING THE COMMERCIAL CHAIN

If life seemed to be smooth in your last years working at shipping industry, most likely you have never experienced a setback involving:

- ➔ cargo volume discrepancy, between the official loading or discharging means (Shore loader / Unloader) and draft survey



- ➔ poor cargo quality, moisture and contamination level
- ➔ lack of a ship-to-shore check-list, example: BLU Code.

Frankly, most of players do not disclose the sales contract details holding the joint or individual responsibility's; second, noting the various elements that shall be known in advance for the correct interpretation; third, now that such Brokers as Agents have enrolled among their Customers' personal activity, the latter ends up taking the responsibility for the welfare of their business at both ends. We shall say more of this in a moment.

HOW TO DEAL WITH "SHORE SCALE FIGURES"?

The first point is checking if the Terminal has a valid calibration certificate issued by a competent Customs authority or another regular entity, as the case may be.
Secondly, what are the governing contents for tonnage ascertainment towards the "Sales contract" and "Charter-party". Is there any conflicting wording between them? Are the conditions based on back-to-back backgrounds?

Answering these questions might be quite challenging, but some bullet points Agents and trading (or execution team) should have in mind are:

- ➔ The "international trade allowance" for bulk cargoes is 1%.
- ➔ Owners and their PANDI Clubs shall not accept a cargo tonnage to be declared at "Cargo Manifest" or "Mates Receipt" in case of a discrepancy higher than 0,4% (as observed in Brazilian coverage).
- ➔ Appointing a double-check surveyor, either to monitor a shore scale calibration or to perform another joint draft survey may be required. Usually, the parties binding themselves with final findings, with costs to be borne by the party who did not accept the figures on a first stage.
- ➔ In last cases, Owners and performing Owners can accept the final figures ascertained by shore scale means, even if there is a discrepancy between the draft survey findings, however subjected to a "Letter of Indemnity" to be evoked in case of shortage during discharging ports calls.

For instance, some Ports show even more dynamic factors that may affect the efficiency of a draft survey. Rio Grande Port, located at Brazilian south region, is a good example and showed thereto as per my own wording to guide Master and Owners:

QUOTE

I would like to point out that the inner canal at Rio Grande port is like a bottleneck where densities may change in the same day from 0.999 t/m3 up to 1.025 t/m3. Winds from the quadrant N//NNE/NE/ENE/E improves the ebb current where fresh water comes down river from the big Patos' Lagoon. Winds from other quadrants mainly S/SSW/SW brings sea water into the inner channel resulting in the high tides. During dock water density checking, at every 0.50 m we may find a different salinity.
As the grain terminals Bunge, Bianchini, Termasa and Tergrasa are located at inner channel vicinity, these are impacted for huge densities variation and therefore special attention must be

taken whilst at final stage of cargo loading (trimming) as well during obtaining of final dock water density for draft survey calculation.

Regarding the sampling of dock water during draft measurements, it is worth mentioning that the portable samplers provided by the ship's Chief Officers are generally without lids and completely open, therefore filling with seawater as soon as they are immersed in the water. This way of sampling is completely inadequate where samples are drawn from the water surface only showing lower densities / layers, then the vessel is lying on.
On the other hand, our portable samplers are fitted with small holes in the top lid, therefore filling gradually at the depth where they are positioned. The water samples we collect are always at a depth equal to half the draft at which the ship is floating, and are taken from the port and starboard sides amidships.

UNQUOTE

Source: LPC, a specialized local marine surveyor acting in Rio Grande. http://www.lpcsurveys.com.br/

Nonetheless the fact that some events and claims could be avoided but repeatedly happen, it is important to Agents to suggest a qualified partner able to perform a double-check survey to draft survey issues.

SALES CONTRACT: HOW THEY GOVERN THE PORT LOADING AND UNLOADING CONDITIONS?

What matters supremely, therefore, is not, in the last analysis, the fact that an advisory agent knows the Charter-party in details, but also how He leads with the sales string. At times, a multiple “circle” containing various cargo nominations and different Suppliers, in charge to perform a shipment that may vary from 1,000.000kgs, until 80,000.000 metric tons of soy beans. All of them hold a relevant role into the success of the shipment execution.

Source: Thomas's presentation (in-house training)

ANEC - BRAZILIAN ASSOCIATION OF GRAINS EXPORTERS

https://anec.com.br/

- Sales contracts for soy beans, soy beam meals, maize (corn) and wheat are based on ANEC terms and conditions;
- Mostly FOB basis;
- Forms are produced and frequently adjusted to fit local market practices, needs and regulations;
- Liquidity worldwide;
- Fully respected and supported by international bodies (GAFTA/FOSFA);

FOSFA - FEDERATION OF OILS, SEEDS AND FATS ASSOCIATION LTD

https://www.fosfa.org/committees/

Responsible for setting standards related to sampling, analysis, weighing, arbitration and appeals, demurrage and brokerage. Some contracts of interest:

- FOSFA 4 - OIL SEEDS - FOB (ANEC 41/42)
- FOSFA 22 – South American Soybeans – C&F
- FOSFA 23 – South American Soybeans – CIF

- FOSFA 53 – Oils – FOB (Anec 81/83)

GAFTA - THE GRAIN AND FEED TRADE ASSOCIATION

https://www.gafta.com/

Responsible for setting standards related to method of analysis, sampling, weighing, sampling, fumigation, and arbitration. Some contracts of interest:

- Gafta 123 – Weighing Rules
- Gafta 124 – Sampling Rules
- Gafta 125 – Arbitration Rules
- Gafta 130 – Accepted Methods of Analysis
- Gafta 132 – Fumigation Rules
- Gafta 131 – Optional Clauses

SAL - THE SUGAR ASSOCIATION OF LONDON

https://sugarassociation.co.uk/

Responsible for setting quality standards, grading, sampling and monitoring.

CONCLUSION

Working as an Advisory Agent on the ground can be stressful, but it is funny in the end. You ought to juggle a lot of balls while interacting with all sorts of different people and cultures. After all, the “peace of mind” state from Principals is our ultimate goal.

It is far easier to handle such activities when you have a robust infrastructure, trained and skillful personnel, solid in-house quality systems, governance and compliance procedures, laytime software (Example: Enqlare) for commodities, port data statistics and a range of smart tools which contribute to setting the bar higher and get conflicting issues resolved, as weather statistics for the upcoming 6 months, enabling Owners to understand “the ropes” and be in a better position to predict the risks of the intended shipment dates. Also, use of guidelines regarding stowage plan tips and how to improve the quality and space into holds, aiming to speed up discharge rates at discharging ports, in an efficient and safe way.

Top-tier Clients in the shipping sector seems to be looking into that groundwork and trusted Advisory Agents.

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FUEL EFFICIENCY AND EMISSIONS REDUCTION IN THE SHIPPING INDUSTRY

TUGCE SARAC

TURKEY

2025

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NTRODUCTION

The maritime industry serves as the backbone of global trade, facilitating the transport of approximately 90% of the world's goods. Beyond its economic significance, the sector plays a crucial role in environmental stability due to its energy consumption patterns and related emissions. The ongoing global climate crisis is closely linked to energy production and consumption, with fossil fuel dependence being a primary source of greenhouse gas (GHG) emissions. According to the International Maritime Organization (IMO) 2020 report, the shipping sector accounts for approximately 2.89% of global carbon dioxide (CO_2) emissions—surpassing the emissions of some individual countries. Consequently, improving fuel efficiency and reducing emissions in shipping is not only an environmental imperative but also a regulatory requirement. Technological advancements aimed at enhancing energy efficiency and adopting alternative fuels offer significant opportunities to improve the environmental performance of the industry. In this regard, the IMO's mandatory Energy Efficiency Design Index (EEDI) measures the energy efficiency of new ship designs by

calculating CO_2 emissions per unit of transport work, thereby encouraging the construction of vessels with reduced carbon intensity. This regulation aligns shipbuilding processes with sustainability goals. This study focuses on the relationship between ship engine revolutions per minute (RPM), fuel consumption, energy efficiency, and greenhouse gas emissions.

Engine RPM is a fundamental determinant of fuel consumption and, subsequently, emission levels. Within this context, the compatibility and coordination of ship agencies and brokers with this process play a vital role in enhancing operational efficiency and environmental performance. Ship agencies and brokers ensure the smooth and effective management of operations, providing critical support for the optimization of energy use and implementation of emission reduction strategies.

GLOBAL SHIPPING INDUSTRY AND EMISSIONS

International maritime transport is an important source of greenhouse gas emissions, contributing notably to global climate change. According to the International Maritime Organization's Fourth Greenhouse Gas Study, shipping emitted approximately 1,056 million tonnes of CO_2 in 2018, accounting for about 2.89% of total global anthropogenic CO_2 emissions that year (IMO, 2020). Projections state that, without additional mitigation measures, emissions from the sector could rise by up to 50% by 2050 compared to 2018 levels (CE Delft, 2020).

Large container vessels and bulk carriers, due to their substantial engine power requirements, are major contributors to CO_2 and nitrogen oxides (NO_x) emissions. The widespread use of heavy fuel oils (HFO), which possess high energy density however poor environmental profiles, further exacerbates this matter. Thus, reducing emissions have need of fuel switching and improvements in engine efficiency.

When we examine the energy Efficiency Design Index (EEDI) and Its Role in Maritime Decarbonization, it should be highlighted that the International Maritime Organization introduced the Energy Efficiency Design Index, in other words EEDI in 2013 as a mandatory regulation aimed at improving the energy efficiency of newly built vessels. As the first global climate-related standard for any transport sector, the EEDI illustrates a crucial step toward

reducing greenhouse gas emissions from international shipping. It quantifies a vessel's carbon dioxide (CO_2) emissions per tonne-mile of transport work and sets a maximum limit that progressively tightens over time. This regulatory pressure has pushed innovation across the maritime industry, compelling ship designers and manufacturers to pursue more sustainable and energy-efficient solutions.

For example, from 2025 onward, new container ships must achieve at least a 30% reduction in CO_2 emissions compared to the 2000–2010 baseline (IMO, 2020b). In response, the industry has adopted a variety of advanced Technologies with lightweight composite materials, optimized hull and propeller designs, and low-RPM, high-efficiency engines. These measures not only drop emissions but also enhance fuel economy, yielding both environmental and operational benefits.

The EEDI has proven to be more than just a compliance mechanism, it serves as a catalyst for innovation in ship design. By enforcing performance-based targets rather than prescriptive technology mandates, the regulation authorises flexibility in how shipowners meet emission thresholds. This approach fosters technological diversity and encourages investment in R&D tailored to specific vessel types and trade routes.

On the other hand, the regulation primarily enforces to newbuild ships, meaning a vast number of existing vessels are not directly affected. To address this gap, the IMO has introduced complementary measures such as the Energy Efficiency Existing Ship Index (EEXI) and the Carbon Intensity Indicator (CII), which target operational efficiency for the global fleet.

Despite its limitations, the EEDI remains a cornerstone of the IMO's broader decarbonization strategy, which includes decreasing total GHG emissions from shipping by at least 50% by 2050 compared to 2008 levels (IMO, 2018). As such, EEDI not only shapes the technical trajectory of the maritime industry but also reinforces the alignment of shipping with global climate goals.

While the Energy Efficiency Design Index remains a substance of global decarbonization efforts guided by the International Maritime Organization, regional policies and market-

based mechanisms are increasingly critical in accelerating its affect. Among these, the European Union has positioned itself as a pioneer in maritime climate governance by integrating complementary regulatory tools that reinforce EEDI goals.

As of January 2024, the European Union has formally included maritime transport within its Emissions Trading System. This policy is to require shipping companies to purchase emissions allowances for every tonne of carbon dioxide emitted by vessels operating within EU waters or making calls to EU ports. By assigning a monetary value to CO_2 emissions, the system creates direct economic incentives for shipowners to invest in low-emission technologies and EEDI-compliant vessel designs (European Commission, 2023; EMSA, 2024). The higher the ship's energy efficiency, the fewer emissions it produces, and consequently, the lower its compliance cost under the ETS.

Furthermore, many European port managements are implementing positive reinforcement strategies to reward environmental performance. Vessels with favourable EEDI ratings or overall lower emissions may receive discounts and to have low costs. For example, some the ports offer incentive programs based on a ship's Environmental Ship Index (ESI) score or other sustainability metrics, which often correlate with EEDI compliance (Port of Rotterdam, 2023; Green Award Foundation, 2023).

These initiatives are cantilevered by wider industry programs. These initiatives ensure standardized frameworks for measuring and recognizing ship-level environmental performance. Though voluntary, these schemes have acquired traction across Europe and parts of Asia and align closely with the objectives of the EEDI by supporting energy efficiency and emissions transparency (Green Award, 2023).

Through such regional measures, the European Union and its maritime stakeholders are effectively extending the influence of EEDI from the design phase into active vessel operation. While the IMO assures the global regulatory baseline, regional mechanisms like the EU ETS and port-based incentives translate policy into tangible economic and environmental results—encouraging continuous innovation and accelerating the transition to low-carbon shipping.

FUEL TYPES AND CARBON INTENSITY

The widespread reliance on Heavy Fuel Oil (HFO), Marine Diesel Oil (MDO), and Marine Gas Oil (MGO) is rooted in historical cost efficiency and high energy content. But, these fuels present important environmental drawbacks, especially HFO, which contains high levels of sulphur and heavy metals. The use of heavy fuel oil ensues in substantial SO_x and PM emissions, contributing to both air pollution and acidification in marine ecosystems.

In addition, MDO and MGO are still fossil-based and contribute to substantial CO_2 emissions. The International Maritime Organization's IMO 2020 regulation, which limits sulphur content in marine fuel to 0.5% m/m globally, has pushed many shipowners to switch to low sulphur

alternatives, install exhaust gas cleaning systems (scrubbers), or consider alternative fuels (IMO, 2020). As a result, conventional fuels present short-term operational familiarity and infrastructure support but are incompatible with long-term climate targets.

Carbon intensity, measured in kilograms of CO_2 emitted per kilogram of fuel burned, serves as a key indicator for comparing the environmental impact of marine fuels. It should be emphasized that the overall greenhouse gas affect also depends on other pollutants such as methane, nitrogen oxides (NO_x), and particulate matter (PM), which can substantially impact the total emissions profile. Therefore, carbon intensity seems as a key driver in regulatory compliance (e.g., EEDI, EEXI, and CII) and investment decisions. In conclusion, carbon intensity has an important factor for comparative analysis, but it must be contextualized within broader lifecycle and operational frameworks.

Several low- and zero-carbon fuels are under consideration to reduce maritime emissions. Liquefied Natural Gas is the most widely adopted transitional fuel but is limited by methane slip, which undermines its CO_2 reduction benefits due to methane's high Global Warming Potential (Faber et al., 2018).

Biofuels offer compatibility with existing engines however face sustainability challenges and scalability constraints, with lifecycle emissions varying significantly by feedstock and production method (Corbett et al., 2020). Hydrogen and ammonia are zero-carbon fuels when produced renewably; however, their deployment is restricted by safety concerns, NO_x emissions from ammonia combustion, and insufficient bunkering infrastructure (Bicer et al., 2020). Methanol provides a practical alternative, with easier storage and handling than hydrogen or ammonia, and can operate in dual-fuel engines. Its environmental benefits, however, depend heavily on production pathways (Mekhilef et al., 2012).

Therefore, alternative fuels present viable decarbonization routes but remain constrained by technological maturity, safety issues, and economic feasibility.

When we examined the fuel properties, engine design, and propulsion efficiency, we found that the relationship between fuel characteristics and engine operation is primary to optimizing propulsion efficiency and decreasing emissions in maritime vessels. Each fuel has distinct combustion properties—such as energy density, volatility, and ignition behaviour—that require tailored engine designs and operating parameters.
For instance, engines powered by Liquefied Natural Gas typically operate at lower RPMs and require optimized injection timing to maximize combustion efficiency and minimize methane slip. Alternative fuels such as biofuels, methanol, hydrogen, and ammonia further complicate engine performance by affecting thermal efficiency and emission profiles. These variations necessitate adaptive engine technologies, advanced after-treatment systems, and precise operational strategies to fully leverage their environmental benefits. In this context, RPM optimization is important. For instance, LNG-fuelled engines must balance lower optimal RPM ranges with voyage speed and emission reduction targets. Digital engine monitoring and control systems has a significant role in sustaining compliance and enhancing efficiency across varying operational conditions.

Fuel choice affects not only emissions but also the vessel's propulsion dynamics and overall efficiency. This integrated perspective is fundamental to acquiring significant emission reductions while ensuring economic and operational viability.

The key priorities must encompass a comprehensive assessment of lifecycle environmental impacts, ensure optimal compatibility between fuels, engines, and operations, address regional regulatory differences such as the EU Emissions Trading System (ETS), and align industry initiatives with the IMO's objective of cutting greenhouse gas emissions by 50% by 2050.

Achieving a sustainable maritime future requires collaboration not only among shipbuilders, engine manufacturers, fuel suppliers, regulators, and operators but also with ship agencies and brokers. These intermediaries are vital in guiding shipowners through fuel selection, regulatory compliance, and operational optimization amid evolving environmental standards.

Given the complexity and diversity of fuels and technologies, a flexible, data-driven approach supported by digitalization is essential for maximizing vessel performance and meeting regulatory requirements. Ship brokers and agencies, positioned at the nexus of market knowledge and operational execution, offer critical support by advising on fuel availability, chartering options, and compliance strategies, enabling shipowners to navigate the transition efficiently. The shift toward diverse, tailored fuel solutions aligned with vessel types and trade routes demands adaptability and innovation. While integrated research, strong policy frameworks, and market incentives remain fundamental, the active engagement of brokers and agencies is key to accelerating the maritime sector's decarbonization by bridging technical, commercial, and regulatory aspects.

OVERVIEW OF MARINE ENGINE TYPES

Marine propulsion relies primarily on two-stroke and four-stroke diesel engines, each exhibiting distinct operational and environmental characteristics that critically influence fuel efficiency and emissions. Two-stroke engines, favoured in large ocean-going vessels due to their ability to deliver continuous power at low speeds, benefit from high torque and fuel efficiency on long voyages. Their large cylinder diameters and slower RPM optimize combustion, resulting in lower specific fuel consumption (Wang, Corbett, & Firestone, 2017). However, the traditional scavenging process in two-stroke engines leads to higher methane slip and particulate matter emissions.

In contrast, four-stroke engines, commonly used in smaller vessels and auxiliary power units, operate at higher speeds and provide greater flexibility in power output and fuel options, including alternative fuels like LNG and biofuels. Their precise combustion control allows for lower NO_x and particulate emissions, often enhanced by technologies such as exhaust gas recirculation (EGR) and diesel particulate filters (ICCT, 2020).

Engine RPM is a pivotal factor influencing combustion efficiency and emissions. Both engine types have an optimal RPM range where specific fuel consumption is minimized; operating outside this range increases incomplete combustion and frictional losses, thereby escalating fuel consumption and emissions (Wang et al., 2017). Modern engine management systems that adjust injection timing, turbocharging, and exhaust gas recirculation in real time are essential to maintain operation within these optimal ranges, maximizing thermal efficiency and emission control (IMO, 2019).

From a regulatory perspective, the Energy Efficiency Design Index (EEDI) incentivizes the adoption of engines and technologies that reduce CO_2 emissions per transport work unit. Two-stroke engines, with their inherently high efficiency at low RPMs, can achieve favourable EEDI scores, especially when paired with low-carbon fuels. Yet, to meet increasingly stringent standards, optimization of engine RPM and advanced emission control systems are imperative (IMO, 2019). Four-stroke engines, while more adaptable in fuel types and suitable for smaller vessels, typically operate at higher RPMs resulting in greater fuel consumption per power unit, posing challenges for EEDI compliance (ICCT, 2020).
Maintaining precise RPM management through sophisticated control systems is therefore critical across engine types to align operational performance with regulatory targets (Smith et al., 2014).

IN-DEPTH ANALYSIS OF RPM OPTIMIZATION IMPACT

Engine speed (RPM) is a crucial parameter that significantly affects marine engine performance, fuel consumption, and emission profiles. This section provides a comprehensive examination of how optimizing RPM influences thermodynamic efficiency, fuel consumption models, emission generation, and regulatory compliance metrics such as the Energy Efficiency Design Index (EEDI).

Marine engines exhibit peak thermodynamic efficiency within a specific RPM range. As RPM increases, the combustion duration shortens, which can lead to incomplete combustion, thereby increasing emissions such as CO, unburned hydrocarbons, and particulate matter. Simultaneously, mechanical losses due to friction and moving parts rise, which further escalates fuel consumption (Zhou & Fang, 2019). Conversely, operating at very low RPM results in increased engine load and unstable combustion, leading to reduced efficiency (Wang et al., 2017). These findings highlight the critical importance of maintaining engine RPM within an optimal range to balance fuel efficiency and emissions control.

Specific fuel consumption typically measured in grams per kWh, directly correlates with engine RPM. Specific fuel consumption reaches its minimum at the engine's optimal RPM, representing peak efficiency. Deviations above this optimal speed, for instance a 10% increase in RPM, can result in a 5–8% increase in fuel consumption (Wang et al., 2017).
Furthermore, engine load combined with RPM changes heavily influences combustion efficiency; for example, running at high RPM under low load conditions causes inefficient

fuel use (ICCT, 2020). These dynamics underscore RPM's pivotal role in accurate fuel consumption modelling and optimization.

Variations in engine RPM significantly impact the generation of harmful emissions, particularly nitrogen oxides (NO_x) and particulate matter (PM). Higher RPMs elevate combustion temperatures, accelerating NO_x formation (Høyer & Skaarup, 2021). In contrast, lower RPMs may cause incomplete combustion, resulting in increased particulate emissions. Optimal RPM management improves the effectiveness of emission control technologies such as Selective Catalytic Reduction and Exhaust Gas Recirculation (EGR), which rely on stable combustion conditions for maximum efficiency (IMO, 2019).

The Energy Efficiency Design Index (EEDI) relies heavily on engine performance metrics, which are sensitive to RPM variations. Operating engines at low RPM and load conditions increases specific energy consumption, thereby raising the EEDI score. Conversely, RPM optimization reduces energy use and improves EEDI ratings (Smith et al., 2014). Achieving compliance with EEDI standards also necessitates integrating alternative fuels and advanced technologies, making RPM tuning an integral part of a multifaceted efficiency strategy (IMO, 2019).

Optimizing engine RPM is essential for advancing fuel efficiency and reducing environmental impact in maritime operations. Maintaining engine speeds within the thermodynamically optimal range minimizes fuel consumption and emissions simultaneously. However, striking this balance is a complex engineering challenge since excessively high RPMs increase harmful emissions, while very low RPMs degrade fuel efficiency. Modern engine control systems play a vital role in this context, providing real-time adjustments to fuel injection timing, turbocharging, and exhaust gas recirculation to ensure optimal combustion.

Furthermore, evolving regulatory frameworks such as IMO's EEDI push for integrated solutions that consider not only engine speed but also fuel type, emission control technologies, and operational strategies. This holistic approach is key to achieving sustainable maritime operations. Therefore, RPM optimization is a fundamental technical lever in the transition to greener shipping. Advances in digitalization and AI-driven engine management are expected to further enhance these gains, maximizing both environmental benefits and operational cost savings.

In the light of the above information, it demonstrates the critical role of RPM optimization in reducing fuel consumption and emissions. Coupling engine operational strategies with advanced emission control technologies ensures compliance with evolving regulations and supports sustainable shipping practices.

IMPACT OF EU MRV REGULATIONS AND IMO SUPPORT ON SHIPPING AGENTS/ SHIP BROKERS

The European Union's active support of the International Maritime Organization (IMO) as the key regulator of emissions from the international shipping sector—and the proposal of EU-wide Monitoring, Reporting, and Verification (MRV) regulations—significantly influences the roles of shipping agents and ship brokers within the maritime industry.

Shipping agents and brokers act as vital intermediaries, guiding shipowners and operators through the complex process of complying with MRV regulations. Given that MRV requires systematic data collection and transparent reporting of vessel emissions, agents can provide essential support by managing data flows, ensuring accurate documentation, and facilitating adherence to evolving legal frameworks.

Agents have a key role in optimizing port and voyage operations to improve fuel efficiency. Brokers, meanwhile, can advise shipowners on adopting new fuel-saving technologies and operational strategies—such as speed optimization—that reduce emissions and operating costs. This operational consultancy aligns closely with the EU and IMO's goals to promote energy-efficient shipping.

Compliance with MRV and IMO regulations offers shipowners a reputational edge in a market increasingly valuing environmental responsibility. Shipping agents and brokers help their clients leverage this advantage by enabling transparent emissions reporting and by facilitating the adoption of greener practices, thus enhancing market access and client relationships.

Transparent emissions reporting supports financial institutions and investors in evaluating environmental risks associated with shipping assets. Agents and brokers play a critical role by ensuring timely and accurate emission data, which can improve clients' access to green financing, favourable loan terms, and investment opportunities aligned with sustainability criteria.

As a result, the EU's MRV regulation and IMO's emission frameworks expand the scope and importance of shipping agents and ship brokers as compliance facilitators, operational efficiency consultants, market enhancers, and financial risk managers. These developments elevate their strategic role in driving environmental performance and sustainability in the shipping sector.

CONCLUSION

This study clearly demonstrates that optimizing marine engine revolutions per minute (RPM) is essential for reducing fuel consumption and lowering greenhouse gas emissions in the shipping industry. Maintaining engine RPM within an optimal range improves combustion efficiency, reduces fuel waste, and minimizes harmful emissions such as nitrogen oxides and particulate matter. These improvements help ships comply with international regulations like the Energy Efficiency Design Index (EEDI) and also reduce operational costs through better fuel economy.

However, RPM optimization alone is not enough. Effective emission reduction requires a combined approach that includes choosing the right fuel type, applying advanced engine technologies, and implementing real-time engine management systems. These factors work together to maximize energy efficiency and minimize environmental impact during vessel operations.

Ship agencies and brokers play a crucial role in this process by supporting shipowners in navigating complex technical, commercial, and regulatory challenges. They use decision-making tools such as the Analytic Hierarchy Process (AHP) to evaluate and balance different factors, including engine RPM, fuel types, emission limits, costs, and operational needs to find the best solutions tailored to each vessel and trade route.

By applying structured decision methods like AHP, agencies and brokers provide clear, data-driven advice that helps optimize ship performance and meet environmental goals. Their expertise ensures that ships not only comply with regulations but also operate efficiently and economically.

In summary, optimizing engine RPM is a key technical step toward greener shipping, but its success depends on coordinated action across technology, operations, and strategy. Ship agencies and brokers are vital partners in this effort, bridging the gap between technical innovations and real-world operations. Their involvement accelerates the shipping industry’s transition to sustainability, supporting global climate targets and securing a more efficient, low-emission future for maritime transport

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A THREAT OR AN OVERUSED BUZZWORD? HOW ARTIFICIAL INTELLIGENCE AND DIGITALISATION WILL SHAPE ONSHORE CAREERS IN COMMERCIAL SHIPPING

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2025

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ABSTRACT

The threats to careers in shipping are well documented (Heilig, Schwarze and Voß, 2017). Both onshore and offshore careers are vulnerable to automation more recently, artificial intelligence has highlighted the potential threat to traditional maritime roles. How this will look in practice is still the subject of much debate in an industry traditionally conservative and slow to adopt new technologies. This innate cautiousness and skepticism are nothing new in commercial shipping (Pallis, Kladaki and Notteboom, 2024) – we are fortunate not to still be reliant on coal as the dominant method of propulsion as was the mid-20th century concern over having 'explosive' crude oil on board despite the higher energy efficiency and clear benefits of this 'new fuel'. Ultimately, shipowners and charterers are in business to make money and, if something can make a clear business case, change is inevitable.

This dissertation will explore the impact that Artificial Intelligence (AI) and digitalisation could have across shipping – with a specific focus on shipbrokers, ship agents, and trade documents such as bills of lading. By combining a dual-method approach using four interviews from across the author's network and the author's own machine learning model of the Baltic Exchange Index, this study will thoroughly explore the threat that AI poses. Within this dissertation, 'AI' may often be used as a catch all term for Artificial Intelligence and Machine Learning – both of which are being thoroughly explored throughout this dissertation.

The research will critically assess whether AI will pose an existential threat to shipping careers or, alternatively, can serve as a powerful tool that will enhance the efficiency of shipbrokers and ship agents. First, it will investigate the traditional paper-based practices of bills of lading and the campaign, led by the Future of International Trade (FIT) Alliance, to transition to electronic bills of lading while discussing the business cases and challenges in the adoption of these technologies based on firsthand experience and interviews. Next, this dissertation will explore AI in commercial shipping today to critically develop potential scenarios for the future of chartering and careers within chartering – it then considers these scenarios from the perspectives of shipbrokers as interviewed for this dissertation. Finally, this dissertation will present a technical case study using the author's own Baltic Exchange Index prediction model to examine the threat of the development of this technology to analysts and brokers, whose roles rely on capturing market sentiment.

DIGITAL TRANSFORMATION WITHIN SHIPPING

Shipping is an industry ripe for digitalisation. Commercial shipping in the 21st century is primarily made up of a mix of contracts from 1946, paper-based documents, archaic administrative systems, and only fifty years ago, Telex was phased out as the main form of communication. Since that time, the world has changed such that computerized administrative systems and smartphones run our lives to such an extent that 90% of the world's data – approximately 330 zettabytes (that's 33 followed by 22 zeros) – has been created in the past two years (Bartley, 2024). From a macro perspective, we have a rapidly digitalizing world with a slow and disorganized shipping industry falling behind. The very nature of shipping is driven by financial incentives and provided that shipping follows the principles of free market economics (Smith, 1776), digitalisation and optimization will occur if there is a business case and some form of coordinated effort towards change. From a more granular perspective and from the perspective of clients facing roles like shipbrokers, ship agents, and those involved in commercial shipping, the challenges to digitalisation arise in being the first movers to technology and the concern that by being the first to implement a technology you might lose clients and miss out on business.

There are examples of a coordinated effort towards digitalisation with a strong business case within shipping. A good example is the work of the FIT Alliance in pushing the industry to adopt electronic bills of lading (eBLs) – the digital version of a crucial trade document.

ELECTRONIC BILLS OF LADING AS A CASE STUDY FOR TRADE DIGITALISATION

The bill of lading is a paper-based document that facilitates the movement of goods as a 'document of title' which provides legal protection and acts as a proof of contract for shippers and receivers to discharge the cargo (CargoX, 2023). Bills of lading are similar to receipts in that they carry the seal of the shipper and proof of carriage, in fact, the very first bills of lading in medieval Europe were this simple and were used to discharge cargo and validate long distance trade (Encyclopaedia Britannica, 2025). Bills of lading were first established as a 'document of title' in Lickbarrow vs Mason (1794) which established the core principles of bills of lading as a legal document: their negotiability, document of title, and protection of the holders of these bills of lading providing purchasers were acting in good faith (Law Explorer, 2016). Later, through the 19th and early 20th centuries, international agreements like the Hague and later the Hague-Visby rules were developed to require carriers to issue bills of lading and standardize trade at sea. Since then, very little about the bill of lading has changed, a bill of lading is first issued at the load port to both shippers' and receivers' banks and finally for presentation at the discharge port before discharging can commence (see Figure 1). These bills of lading travel separately to the cargo using a network of couriers to arrive at the discharge port after having been processed by both banks before the cargo to commence discharging.

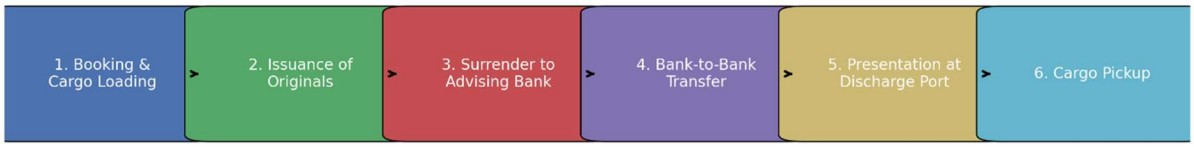

Figure 5 shows the processing of a bill of lading from load port to discharge port (Author's own)

This process in its entirety can often take weeks and, especially on shorter voyages and oil trades, the paper bill of lading might not arrive before the cargo, in which case, a letter of indemnity has to be issued in order to discharge the cargo. These letters of indemnity present a legal and financial risk for all parties and if the cargo is mis-delivered to someone not entitled under the original bill of lading, the carrier becomes liable for the full value of the cargo (Saftey4Sea, 2016).

This 'letter of indemnity problem' was one of the initial motivations behind the creation of the first electronic bill of lading platforms with the development of Bolero and essDOCS in the late 1990s and early 2000s. Since that time, there have been tens of other electronic bill of lading platforms all developed with the aim of providing a platform to pass eBLs between all parties efficiently and it is estimated that today approximately 5% of all bills of lading issued globally are electronic (DCSA, 2023). This already steady progress, combined with the Electronic Trade Documents Act 2023 being passed into English law, has meant that electronic bills of lading are now classed as a legal trade document with the same legal effects as paper trade documents – removing any legal implications for using an electronic bill of lading over a paper bill.

In addition to the 'letter of indemnity problem', the digitalisation of this crucial trade document has other benefits too. A McKinsey study cites that by converting to electronic bills of lading, the world economy could save up to $6.5 billion in direct costs as well as up to $40 billion in global trade per year (Casanova *et al.*, 2022). This clearly presents an overwhelming business case by reducing costs and time and resources taken to print, stamp, sign, and process each of these bills of lading - especially in the container trades where there can often be thousands of bills of lading on board for each voyage. This presents an opportunity for the container companies', says Grant Hunter, the Chief Digital Officer and director of products at BIMCO in an interview with the author (G. Hunter, interview by author, 2025). Who goes on to say that, traditionally, the processing of these bills of lading had been profit centres for them where they would charge shippers and receivers handsomely for the privilege of handling these bills of lading; with the threat of the digitalisation of this trade document, container companies will need to find new ways of generating profit (G. Hunter, interview by author, 2025).

THE ELECTRONIC BILL OF LADING REVOLUTION

It is clear that changes are needed for all of the approximately 105,000 commercial cargo ships around the world (UNCTAD, 2022) to adopt completely eBLs for each of their voyages. It is also clear that some sort of revolution needs to be led by the biggest companies and organisations to help encourage smaller companies to also invest in this technology. According to Grant Hunter (G. Hunter, interview by author, 2025), this change is already occurring with some of the

largest container shipping companies like Taiwanese shipping giant, Evergreen, reporting the use of between 40-50% electronic trade documents in their trades throughout 2024 with the aim of increasing this figure annually by encouraging shippers with larger trade volumes to process these eBLs through one of the eBL platforms. Of these eBL platforms, ten of them are approved by the international P&I clubs having full insurance coverage akin to a paper bill of lading.

As part of leading from the front and taking the initiative to encourage shipping to adopt electronic bills of lading, the FIT Allianc was formed in February 2022 by five leading membership organisations from across shipping (BIMCO, DCSA, FIATA, ICC, Swift) and serves as a clear example of NGOs taking action on digitalisation in shipping for the overall benefit of the industry. The FIT Alliance has one clear aim of achieving the '100% adoption of a standards-based eBL' (FIT Alliance, 2022) within which, it's membership organisations like BIMCO have set their own targets like '25 by 25' and '100% by 2030' from BIMCO in the dry bulk trades and by DCSA in the container shipping trades, respectively. According to BIMCO, their '25 by 25' campaign to get some of the world's biggest shippers to move 25% of one dry bulk commodity using an electronic bill of lading by 2025 was a great success with the final figure for eBL adoption across the four of the world's biggest shippers published at the end of 2024 being 25.1% (BIMCO, 2025).

As Hunter suggests (G. Hunter, interview by author, 2025), we are approaching a tipping point in digitalisation whereby shippers and receivers are now approaching shipping companies and saying they would prefer to use electronic bills of lading rather than the other way around. Once this point is reached by around 50% of shipping companies, Hunter (2025) believes it will soon become easier for companies to make use of these electronic bill of lading platforms rather than not. Despite this optimism from BIMCO and the FIT Alliance and the clear business case and incentives for containers and dry bulk, there is perhaps less of an impetus for eBLs from the tanker market where cargoes are often traded at sea with much less lead time. This highlights one of the pitfalls of using electronic bills of lading platforms, normally requiring each counter party to be set up on each of the platforms prior to the issuance of the bill of lading. This is a problem of interoperability. Some eBL platforms are incompatible with others making it a time-consuming process to sign up to each platform individually. The interoperability issue, however, is something that some of the largest eBL platforms are in collaboration with each other on to improve adoption of this technology. Grant Hunter (G. Hunter, interview by author, 2025) points this problem out in our interview, by suggesting that while we are seeing an impressive increase in the use of electronic bills of lading, the current adopters are the 'low hanging fruit', the big shippers trading internally or with a small number of different clients; full adoption of eBLs will require a greater industry buy in.

The FIT Alliance and the progress of the adoption of eBLs highlight a clear desire for digitalisation within shipping and provide a success story for the benefits and challenges associated with digitalisation. In many ways, the commitment by the FIT Alliance in support of a wider goal is exactly as required in order to improve digitalisation. While the continued success of eBLs and the ongoing digitalisation of this crucial trade document is a success, it also serves as a microcosm for the wider industry over the next decade with lessons learned from this process that can relate to future changes across shipping.

ARTIFICIAL INTELLIGENCE IN COMMERCIAL SHIPPING

Akin to digitalisation, Artificial intelligence (AI) has become a more relevant but still ubiquitous buzzword to signal future efficiency and innovation without any real scrutiny (Brynjolfsson and McAfee, 2014) and is fast becoming a crucial marketing tool for companies around the world. AI has been cited at an exponentially increasing rate with Semrush (2023) reporting that, following the release of ChatGPT, searches including the term 'AI' increased by over 800%. This is not isolated outside of shipping. Shipping has also seen a whole host of AI technology platforms that will 'streamline fixtures' and enhance 'workflow efficiency' - all claiming to make best use of this technology.

While the scale, efficacy, and integration of AI will only truly be known with time, based on current progress and trends, AI will impact every aspect of shipping and may replace human workers in both on-shore and off-shore careers. Whilst intensely interesting and of paramount importance to the world's 1.89 million seafarers (UNCTAD, 2021), the opportunity presented by autonomous ships is beyond the scope of this dissertation. Instead, this section will focus on providing a comprehensive overview of the potential impact and scenarios that AI will have on workflows, commercial management, and careers within the shipping industry. This dissertation will explore and analyse a range of potential scenarios including the full and partial replacement of humans in commercial shipping roles to better understand the impact that AI technology plays to onshore careers in shipping and the positive and negative impact it may have on the ability to move goods around the world.

CURRENT USE OF AI IN SHIPPING

Shipping is known for its' 'conservative nature' and 'long asset lifespans' which often makes for the adoption of new technologies a slow process (Howard, 2024). Despite this, times are changing, in February 2025, a collection of five of the largest shipbrokers (SSY, Arrow, Howe Robinson, Gibson Shipbrokers, and Ifchor Galbraiths) teamed up to create Ocean Recap, an AI-adjacent charter party management tool to help streamline the creation of recaps and to help 'challenge Clarksons' charter party management dominance' (TradeWinds, 2025). While only being announced in February 2025 and not necessarily the first platform to use AI in shipping, it certainly represents a significant step forward by being the first AI tool to be founded and publicly backed by five of the biggest shipbroking shops. An anonymous shipbroker from Howe Robinson (Anonymous Broker at Howe Robinson, 2025), shared that the Ocean Recap system is an AI tool 'designed to help brokers draw up charter parties and recaps after the deal has been concluded'. This perspective best describes the portion of the market that Ocean Recap will fall into: an AI tool to help brokers rather than replace brokers. This perspective is reiterated by other broking shops in the industry too. A Senior Director at SSY, Alexander Foster, believes that 'brokers will not disappear in the presence of AI, only there will be tools to make broking more efficient' (A. Foster in Interview by Author, 2025). It is likely that as AI becomes more capable, the role of a broker will become less admin based in drawing up Charter Parties and recaps and will increasingly be focused on building relationships and connecting clients around the world.

Perhaps then, the best and most comprehensive use of AI would be in voyage planning and risk management. Today, voyage planning in commercial shipping already relies on external

weather routing companies to provide forecasts that use complex numerical based weather prediction models (e.g. ECMWF GFS) to create optimal routes and meet safety criteria from which the Master has final say on which route the vessel takes (Song and Cao, 2024; Saftey4Sea, 2022). These external weather routing companies then use satellites to determine whether a vessel meets its performance guarantees or warranties, as stipulated by the head owner prior to a voyage or time charter. Further AI driven analysis integrated into these systems may be able to more accurately determine whether a ship is meeting its warranties as provided by the ship owner. A study by a shipping startup, Orca AI, estimates that if shipping were to use AI tools for sea navigation to reduce the number of sharp manoeuvres and route deviations, global commercial shipping could cut carbon emissions by up to 47 million tonnes per year – translating to an annual fuel saving per vessel of $86,000 (Orca AI, 2024).

The same principal of using AI as a prediction engine could be applied to vessel risk management too. The US based web-based ship management platform JiBe ERP has recently launched a tool that uses the CCTV cameras on board a ship to evaluate and predict where the biggest risks are on board a vessel and alert the master of vessel in real time to prevent accidents. If this technology is as effective as the marketing material suggests, a future update to the SOLAS convention could require ship management companies to use AI as a predictive engine to help prevent accidents across their operating fleets. From seafarers to stevedores, using this technology to improve safety at sea and port operations would improve the overall health of the industry and serves as an excellent example highlighting the potential benefits of partial AI integration in the industry.

HYPOTHETICAL SCENARIOS FOR SHIPBROKING

Today, the role of a shipbroker is to act as an intermediary to bring shipowners and charterers together and facilitate the negotiation and subsequent fixing of a vessel by providing market sentiment and insights to ensure both parties get as fair a deal as possible. The majority of these negotiations between owners and charterers use email to make a series of bids, offers, and counters before an agreement is reached. Once an agreement is reached, the broker is awarded a commission for the facilitation of the deal, which is their core revenue generation stream. Breaking down the role of a shipbroker even further, it is a people and relationship focused role with a number of core admin tasks that that could likely be completed faster and with more accuracy by an AI-bot – both desirable traits in a capital and time driven industry.

Thus far, this dissertation has explored the existing empirical evidence and tools developed to explore how AI might influence careers in shipping. The following section will be an analysis of some hypothetical scenarios for fixing vessels and will explore the opportunities and limits of AI based on the author's own reflections and prejudices. These potential scenarios range from the complete replacement of humans in shipbroking and commercial shipping to the partial replacement of humans and the use of AI-bots for certain tasks. The feasibility of each will be considered over differing temporal scales to gain ten, fifty, and one hundred year perspectives.

PARTIAL AI INTEGRATION USING A CHARTERING PLATFORM

The first of these potential scenarios is the partial replacement of humans in an owner-broker-charterer trade. At its very basic form, a shipbroker is the intermediary between the vessel owner and the charterer providing communication and to exchange offers and bids between the two (or more) parties. The question is, when AI is more capable and more powerful than it is today, could the role of a broker be automated and broking shops could just be technology platforms for charterers and owners to communicate, share bids and provide counters between each party? Any system would still require human shipbrokers to oversee the platform and to intervene if anything went wrong but would also require fewer shipbrokers than a traditional broking shop. This could mean that each broker or 'AI caretaker' would be responsible in supporting an AI-bot in as many as fifty different fixtures per day – clearly more profitable than a human broker, who may fix as many in a year. The role of a human broker in this scenario would be more being a marketer for the platform to owners and charterers - the platform would then connect the counterparties.

This hypothetical scenario is likely oversimplified and would almost certainly be ineffective in the short term. Although the underlying technology to build the platform is relatively straightforward, it would require long term investment and marketing from broking shops - challenges comparable to those faced by the FIT Alliance with eBLs, perhaps with stronger resistance. Progress in shipping is often slow with the 'first mover' paradox seemingly paralysing to a lot of companies, without a strong business case for change. This highlights the biggest problem with the partial AI integration hypothetical scenario being the lack of real benefit for the counterparties involved in the transaction aside from the shipbroking shop. The likelihood is that the only way to convince shipowners and charterers to move to this platform would be to provide some form of monetary incentive by reducing the standard commission for fixing a ship.

In research for this dissertation, many shipbrokers expressed their dislike for this scenario by often citing the importance of relationship building in the fixing of a ship and when concluding 'multi-million dollar transactions, building trust between counterparties is vital' (Broker A, Howe Robinson, Interview by Author, 2025). This is the essence of being a shipbroker and if that changed, the role of a shipbroker would become for similar to a marketing role where the value added would be in bringing people to use your platform.

FULL AI TAKEOVER OF FIXTURES

If you were to take this hypothetical scenario even further, then perhaps the logical solution is to replace all the links in the chain where each shipbroker, owner, and charterer have their own AI-powered bots to negotiate and fix ships either in a virtual shipbroking environment or via email. This system would require very little input from either party but would likely require a human to set a certain number of parameters and aims for the AI-bot to then negotiate on their behalf.

The principal benefit would be the much higher speed of evaluation of a vessel and or a market cargo, creating a faster and more competitive ship fixing environment. As a shipowner or operator, putting a vessel or cargo on the market would mean that within a few seconds there

would be five or ten potential offers from existing vessels or cargoes already on the market. This would place an even greater emphasis on speed and accuracy as within minutes of going on the market, a ship could be fixed subject to terms. This would create a more competitive market and in the short term would likely bring down Time Charter rates (TCE) by increasing the effective supply of vessels by reducing the time taken in matching vessels and cargoes. A TCE rate fall would likely level out at a new equilibrium that priced in the more efficient marketing and negotiation of contracts for vessels.

The problem then becomes technical. How does one negotiate with an AI-bot and how do they negotiate with one another? Would the AI-bots interact like humans but at a much faster rate? The best human negotiations are made up of a series of non-negotiable issues and concessions by both parties to create a mutually beneficial arrangement (Thuderoz, 2017). The art of a broker, therefore, is to make two people walk away from making a deal feeling like they have just made the deal of their life (Foster, interview by Author, 2025). How can you program an AI-bot to make a series of concessions and strategic decisions when negotiating with another AI? This is further complicated if two AI-bots are comparable in their setup and negotiation style – potentially leading to an impasse in negotiations where humans would have to get involved. By reintroducing humans into the loop, then you lose the benefit of speed in a negotiation and how much time would actually be saved?

MACHINE LEARNING CASE STUDY

Shipping freight markets became more like traditional financial commodity markets in May 1985, when the BIFFEX first launched a dry bulk futures contract that provided a centrally-cleared platform for trading futures contracts rather than the traditional 'paper' hedges of shipowners and charterers (Radopoulos, 2014). With time, the market then began trading Forward Freight Agreements (FFAs) and has now evolved to become more of a financial commodity market with growing participation from non-shipping speculators - although still being linked to the Baltic Exchange indices. The increase of non-shipping speculators has meant that these markets are now traded less as a way to hedge their gains and losses in physical markets but now is more of an extension of traditional mainstream finance. Despite this, both markets are good at signalling general industry sentiment and are challenging to predict due to the unforeseen nature of shipping that responds quickly to global crises and geopolitical change. Because freight markets are highly volatile, forecasting these markets has become a vibrant research stream (Katris and Kavussanos, 2021; Liu *et al.*, 2022) due to the potential financial incentives for accurate predictions.

This section of the dissertation will use machine learning to create a proprietary model that will attempt to predict the Baltic Exchange Dry Index (BDI) to explore some of the challenges in creating enhanced index forecasting using machine learning. This section will also explore the threat to the traditional roles of shipbrokers and market analysts that new forecasting technology plays to further gain essential insight into whether this is a genuine threat to careers or remains an ambiguous buzzword.

RIDGE REGRESSION MODEL TO PREDICT THE BDI

Machine learning is a branch of AI focused on the development of systems that uses data and complex algorithms to learn from data and perform tasks without being explicitly programmed. These algorithms can iteratively learn patterns and use data to make predictions from a new dataset and are used across science, business, and technology (Jordan and Mitchell, 2015). While there are many different machine learning algorithms that could be used to predict market trends, this case study uses one of the most common called 'Ridge Regression' due to its computational power and accuracy (Lee, 2025). By combining this algorithm with a separate linear regression model to account for residual corrections in the dataset, you are then able to create a model that predicts the BDI, as shown in Figure 2.

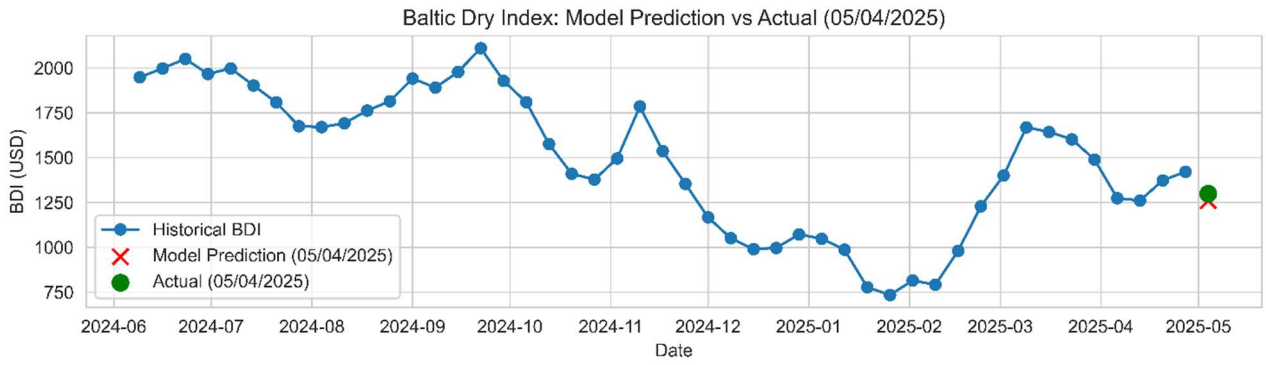

*Figure 6 shows BDI prediction from a Ridge Regression ML model (Source: Author's own) *Model code found in appendix**

Figure 2 is the output from the author's own machine learning model with the blue line highlighting the training dataset being the 51 preceding weeks to the 05/04/25 and the red 'X' being the models prediction with the green circle highlighting the actual BDI value for that day. Despite only using a year's worth of BDI index data, the machine learning algorithm was able to relatively accurately predict the market sentiment for the following week. Despite only being tested on a small dataset and sample size, this still highlights the potential for machine learning models in predicting shipping markets like the BDI. With more resources including more computational power, there is real potential for more accurate models that could be used over longer temporal scales and to predict changes in the BDI. While you cannot predict geopolitical events and the impact on the BDI or shipping, to improve the accuracy of these models you have to be able to price in some type of Geopolitical Risk Index that tracks a physical measure like the frequency of newspaper articles mentioning keywords as shown to spike during major crises (Caldara and Iacoviello, 2022).

With this type of technological improvement and the more accurate pricing in of geopolitical risks and volatility, there is potential for machine learning models to become more accurate than a star shipbroker or analyst. This has the potential to change existing roles that rely on sharing market information. The role of a shipbroker or analyst may become more of a strategic advisory position rather than one that is focused on digesting and disseminating market information. However, it is important to recognise the limits of these models of technical substitution. AI-driven models, although powerful, are constrained to using quantitative methods instead of shipbrokers who gather information qualitatively in conversations to formulate their opinions. Ultimately, while these models could appear to be a threat to data sharing roles, it is likely they will become useful tools rather than replacements for shipbrokers and analysts.

THE FUTURE THREAT TO CAREERS

The underlying discourse surrounding the threat of AI and digitalisation to careers is often polarised – and polarising. On one side, there are a those who are bullish about the future adoption of AI and the impact to careers in the latter half of the 21st century. This optimism likely coincides with their commercial interests to try to sell you their AI platform using the 'latest and greatest' technology and to discourage more cautious types to not get left behind. On the more conservative side, the empirical evidence for successful implementation of AI systems remains sparse in increasing profitability and efficiency even in shipbroking and ship agency roles. A recent Forbes study estimates that only around 25% of firms investing in AI has realised a tangible return on investment, due to the rapid development cycles and significant upfront costs associated with implementation (Forbes, 2025). The truth is: neither side is right. The true future of AI is more nuanced than we might already think (Crawford, 2021). AI powered tools are increasingly able and available to streamline administrative processes, improve the speed and accuracy of contract negotiations, and perform its own market analysis.

As is common with radically new technology or paradigm shifts, the question becomes one of trying to predict where we are on the Sigmoid curve of relative progress (Rogers, Singhal and Quinlan, 2014), see Figure 3. The Sigmoid curve shows an initially slow uptake of any new technology or social change followed by a rapid acceleration in progress and an ultimate plateau in progress nearer the end of a technology's life cycle or having reached market saturation (Rogers, Singhal and Quinlan, 2014). Figure 3 represents the author's best estimate as to where each of these technologies land in terms of progress. Digitalisation, having been around the longest and in this dissertation referring to the further adoption of electronic bills of lading, is nearing the plateau in terms of technological progress, while there is still a long way to go in terms of complete adoption – the biggest mining companies having just passed 25% (BIMCO, 2025) – the technological prowess has almost reached its natural limit. Meanwhile, concept of machine learning has been around for almost 75 years with the first recorded use of the term coming from Arthur Samuel's checker-playing program in 1959 (Samuel, 1959). As a result, machine learning is speculatively further down the Sigmoid curve than digitalisation as there is still vast technological progress to be made in this field. Even further down the Sigmoid curve is AI as it likely currently being used to a fraction of its potential use case. The term AI in this dissertation has, thus far, been used almost interchangeably with machine learning, this is likely a misnomer as AI is a slightly trendier buzzword and is an extension of machine learning. However, it is likely that AI is further still down the Sigmoid curve of progress as AI only really entering the popular conscience in late 2022 with the launch of ChatGPT, since which time there have been an explosion in generative AI based tools, in shipping and beyond (Chui *et al.*, 2023).

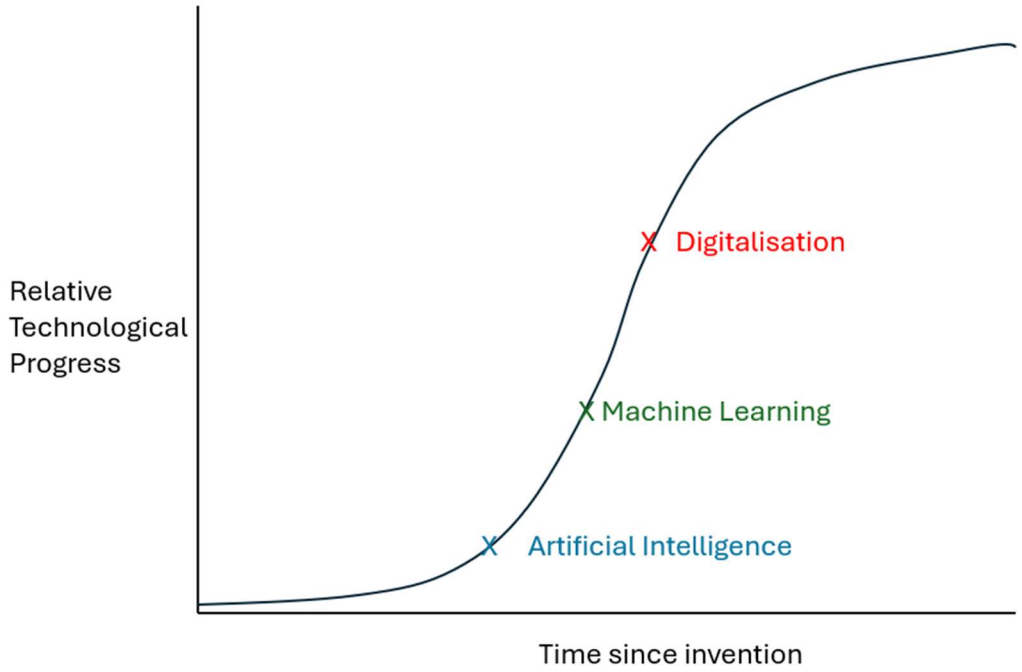

Figure 7 shows a Sigmoid curve of development in shipping (Source: Author's own)

The proliferation of AI tools in the industry could have some unintended consequences. In a scenario, where chartering marketplaces are common and often trades are done via virtual brokers, the market would become more consolidated to those brokerage shops that were able to share the best information and make use of the best AI tools, reducing the numbers of brokers in the market and meaning only the biggest shipbroking shops would survive.

Despite this, Professor Basak Akdemir - a prominent shipping AI researcher and Fellow of IMarEST - remains optimistic on traditional shipping roles in an interview with the Author. She argues that unlike other sectors, shipping is not as simple as a commodity based market and to be successful in shipping, you will always require human expertise (Akdemir, Interview by Author, 2025). She goes on to highlight the importance of upskilling people in traditional maritime roles to teach people how to use AI as a tool and suggests that rather than being a threat, it will bring efficiency gains among other benefits to the industry (ibid). She argues that although shipping is an industry reluctant to change, AI is not rocket science and if there is a business case for change, it will happen (ibid).

In summary, AI and digitalisation likely represent neither an existential threat nor an inconsequential buzzword to careers within shipping despite promising large-scale change. The tools being developed are effective and will likely change the role of a shipbroker and other shore-based careers over the next 50 years by further reinforcing the important of relationships.

CONCLUSION

Shipping will never become obsolete. As the backbone for global trade and responsible for transporting 90% global goods (Kaluza *et al.*, 2010), even the most protectionist and destructive international policy would struggle to completely displace shipping as a key facilitator of global trade. Nevertheless, the industry must not rest on its laurels, as digitalisation and AI is forcing change across all industries and will threaten traditional careers around the world. In shipping, these changes are particularly clear in three areas: digitalisation of trade documents; AI in chartering; and machine learning in market forecasting. This dissertation used empirical evidence, interviews, and a machine learning model to explore the opportunities and threats each of these changes may pose.

A continuous theme across each of these areas was the idea of a critical mass crucial for widespread adoption of any new technology to take place. By encouraging enough people to utilise a technology, suddenly it makes more sense to switch to a new technology rather than stick with the existing technology and process. This is most notable in the adoption of electronic bills of lading where once a critical mass of people start to these digital trade documents, it becomes easier to adopt them rather than resist. Any future research should examine this theme further, potentially with a focus on off-shore roles and the impact of autonomous vessels on maritime employment.

Through interviews conducted for this dissertation, a second continuous theme emerged. Shipping is poised for change. The threats posed by AI and digitalisation are restrained by the complexity of the industry such that humans are required to stay in the loop but perhaps with altered roles. Shipping is resilient and will continue to highly value interpersonal relationships as well as being driven by capital.

Shipping is neither under threat from AI and digitalisation, nor is shipping ignoring the technology. It presents a generational opportunity for those involved and will benefit the shipping industry for years to come.

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CONTAINER TERMINAL OPERATIONS
THE TOOLS OF THE TRADE AND AN OUTLOOK FOR THE SECTOR'S FUTURE

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GREECE

2025

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ABSTRACT

It is widely accepted that shipping is a capital-intensive industry, which requires large amounts of funds to function. Whatever aspect of shipping we examine whether it being actual shipping, the ports industry or logistics providers, the tools of the trade are expensive, heavy and dangerous equipment.

In this paper, we will focus more on the hardware and infrastructure of the container shipping industry. This sector of the maritime industry is a crucial part of multimodal transportation systems and belongs to liner shipping. We will start with a brief historical review of the shipping container and the ports designed to service this type of unitized cargo. Shipping cannot exist without ships so the provision of information about container vessels and their specialized construction is a definite requirement. Also, it is important to inform the reader about all the different types of containers that exist and their purpose.

All this without getting too technical about the specifications or general day-to-day operation since the main purpose of the paper will be to provide an insight to how technological and managerial developments will create value for the industry by facilitating more efficient, greener and quite importantly safer operations in the years to come. As mentioned before, the shipping industry is capital intensive and at the moment is facing something that some professionals might call a paradigm shift whose basis is the environment and all the subsequent regulatory reforms that will require the industry to decrease its environmental footprint.

To conclude the abstract, the paper will provide general information about the equipment and infrastructure of container shipping and in continuation it will show what the future of container shipping holds and what role the shipping agent will have to play during an era of change.

HISTORICAL OVERVIEW

Ancient Greek amphora.

Before the adoption of the shipping container, finished goods were transported in breakbulk form for thousands of years. There were forms of unitization before the ISO standard containers like ancient Greek amphorae, which were clay pots filled with various commodities like wine and oats. The norm of breakbulk cargo, which was the standard way shipping operated for millennia started to change in the middle of the 1950s.

On 26th April 1956 a crane loaded the world's first container ship with its cargo of ISO containers in under eight hours. One container was loaded every seven minutes.

Then came Malcolm McLean, a truck business owner from North Carolina with the idea of unitizing cargo throughout the transportation chain. In 1956, McLean purchased the Pan Atlantic Tanker Company and renamed it to Sea-Land Shipping. Now the proud owner of two WWII oil tankers, McLean, started converting them into the world's first container ships. The first was the SS Ideal X. On her maiden voyage as a container ship in April 1956, she carried 58 containers from New Jersey to Texas. This system dramatically reduced the cost of loading and unloading a ship. In 1956, manually loading a ship cost $5,86 per ton; the standardized container cut that cost to just 16 cents a ton. Containers also made it much easier to protect cargo from the elements or thieves, since they are made of durable steel and remain locked during transport. In the past, freighters spent up to 2/3 of their time in ports, loading and unloading. Port turnaround times, which were as high as 3 weeks, dropped to 24 hours. While still a problem, the rates of merchandise theft dropped dramatically once the goods were sealed away out of sight, untouched by human hands from origin to destination.

Since then, container shipping has become the major method of transporting finished goods in high volumes all over the world. As of 2025, the value of container shipping is estimated to be around 119,65 billion USD. It is a highly specialized market and belongs to liner shipping. Liner shipping usually transports high-value cargo or passengers and calls pre-specified ports on a fixed schedule. The need to keep the vessels' space occupied, to keep the level of service at high levels and to manage each individual container properly from the consignor to the consignee create the urgency to establish a specialized workforce. Sales, customer service, operations, are all tailored to meet the high expectations of this segment of maritime transportation.

THE SHIPPING CONTAINER AND ITS FORMS

The steel used to manufacture shipping containers is called CORTEN (Corrosion Resistance, Tensile strength). Originally used in building bridges and skyscrapers, its high durability and low relative cost made it a good candidate for this purpose since containers have to protect the goods stored inside them from the elements through the various stages of multimodal transportation.

The most common type of shipping container is the Dry Van. Manufactured in lengths of 20 or 40 feet, it is a solid method of cargo unitization and multimodal transportation. Also, 45-foot units are in circulation and are distinguished by the two protrusions on each side lengthwise. These containers provide good protection from the elements, pilfering and at the same time they are cheap to mend in case they get damaged.

Refer containers are used to unitize and transport perishable goods or goods that require a certain environmental temperature. They are manufactured in 20 and 40 foot sizes. The most common ones can reach internal temperatures of -35 to -40 degrees Centigrade but the so called “Ultra Reefers” can go as low as -70 degrees. Temperatures are controlled by a refrigeration unit which is usually mounted externally and plugged in an electric power outlet while on the vessel and at the container yard. If a power source is not available, then a GENSET is used to supply power to the reefer unit.

Flat rack containers are usually utilized for the transportation of heavy equipment and general cargo which cannot be loaded in a standard dry van unit. Same as with the dry vans, flat rack lengths are 20 and 40 feet. The cargoes, also referred to as Out of Gauge (OOG), can protrude from all sides. When the shipments are way over height, special extensions can be used along with Stretchable Racks (specialized flat racks with enhancements to handle high loads) so the gantry crane’s spreader can load and unload them. Furthermore, flat racks are foldable, which allows them to be stacked 3 over 1 when transported empty.

Open top units are roofless as their name suggests and sometimes do not have side doors. They are loaded from above via crane or forklifts. Cargoes vary from over height shipments or bulk cargo like grains, ores or construction materials. They are usually covered by a tarpaulin. Their special construction allows for bulk cargoes to be loaded from the top and unloaded by tipping them over.

Tank containers are used for the transportation of liquids, gases, powders, and foodstuffs among others. They are subject to the same ISO standards as the other types of containers and are handled in similar ways. They consist of a tank which is based on a frame. The frame’s corners have the same dimensions as a standard shipping container. Because of the volatile nature of the cargo transported in ISOTANKS, these units are subject to regular inspection by a competent authority like DNV in order for their integrity and transportational adequacy to be certified.

Open top container.

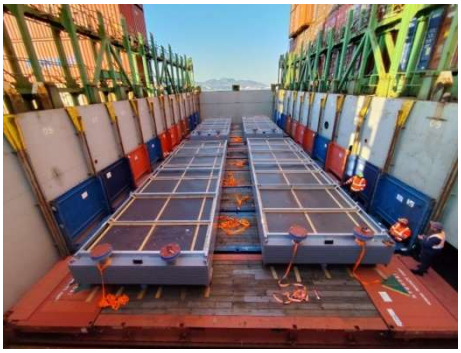
Flat rack container.

Tank container.

Dry van container.

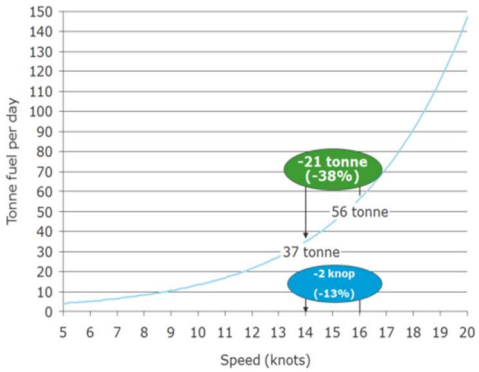
Reefer container genset.

Reefer container refrigeration unit.



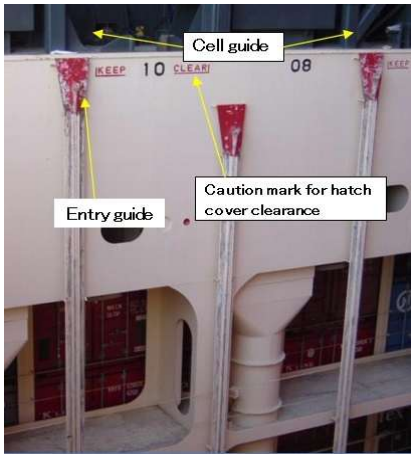
Breakbulk cargo transported by a container ship and discharged at Piraeus. This is a special category of cargo which can neither be loaded in a standard dry van nor a single flat rack. Usually, multiple flat racks are used to create a base upon which the cargo is loaded.

CONTAINER SHIPS



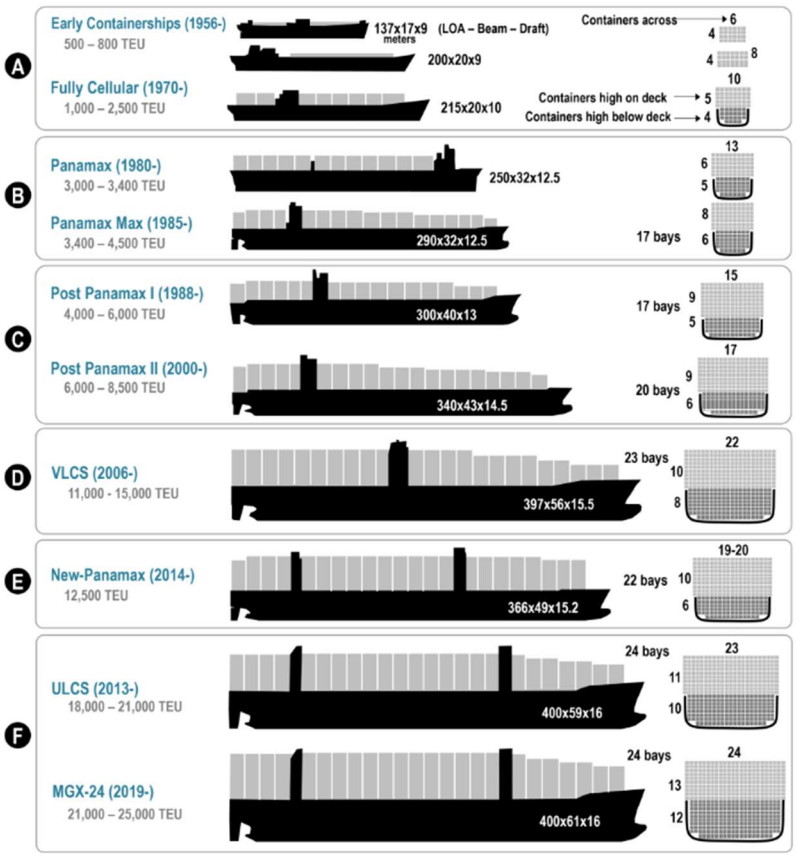
Vessel fuel consumption as a function of speed.

The purpose of this chapter is to provide general information about the vessels deployed by container shipping lines. Container ships are a type of vessel primarily built to transport containerized cargo. Container shipping as mentioned previously is part of liner shipping. It is an express service and requires higher speeds than other shipping segments. The reason is that the value of the transported goods is high, and their timely delivery is of great essence for everyone involved. While other types of cargo ships like tankers or bulk carriers are built with fuller forward and aft sections, container ships are more streamlined in order to achieve higher speeds. In addition to their streamlined design, containerships have more powerful engines when compared to other types of cargo carrying vessels, however, higher speeds mean even higher fuel consumption. As a rule of thumb, a 10% reduction of speed achieves almost 30% savings in fuel consumption. This means that a vessel's fuel consumption varies exponentially for every additional knot gained or lost. Grasping the relationship between speed and fuel consumption is important for understanding the effects on voyage expenses and the environmental footprint of each asset.



Container ship cell guides.

Furthermore, container carriers have special stowage requirements. A lot of planning goes into each voyage in order to get optimal vessel stability and to ensure that the cargo is not spoiled during the voyage. Containers are usually loaded via Quayside Gantry Cranes. To assist in loading and unloading, cell guides are installed in fully cellular container vessels to help speed up cargo operations. Once a container is aligned with the cell guides the gantry crane operator can lower it quickly into position without having to make major adjustments. The unit is like being on train tracks and slides right down. Also, when it comes to their decks, they have lashing bridges. The purpose of lashing the containers that are stowed on deck is to prevent them from coming loose and falling overboard. Lashing is performed by using twist locks and lashing bars to strap down the containers on the vessel. The lashing bridge allows containers to be stowed higher when compared to older container ships. In other words, it acts like a chassis that holds the containers firmly in place. In the figure below, we can see the evolution of container ships by size and carrying capacity expressed in TEUs throughout the past 50 years.



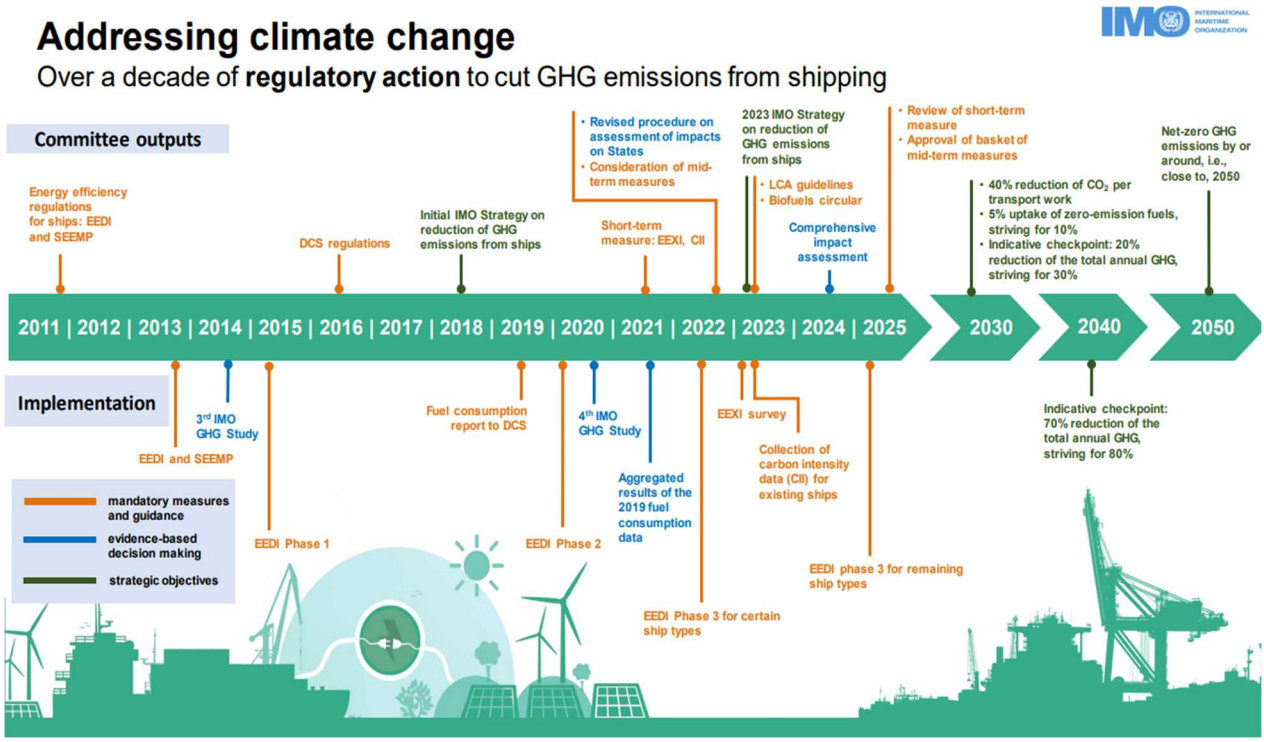
The evolution of container ships during the last 50 years.

A major challenge ultra large vessel operators are presented with is the physical limitations of ports. Ultra large container vessels cannot call small ports due to limitations in draft clearance, quay length, gantry crane boom reach et cetera. This has led the container shipping industry to implement the hub-and-spoke model. Large vessels bring boxes in from different continents and smaller feeder vessels then distribute the cargo to smaller regional ports. Currently the largest container carriers have capacities of around 25.000 TEUs and lengths of 400 meters. It is uncertain if the trend of gigantisation will persist in the coming years. We know that tanker vessels like the Jahre Viking failed to fulfil their transportation role and were used instead as floating tanks. Containership builders should take this as an example and have to understand that further enlarging the vessels has to go hand in hand with the limitations of the facilities that service them.

CURRENT DEVELOPMENTS IN THE MARITIME INDUSTRY AND THE CONTAINER SHIPPING SECTOR

The shipping industry is currently facing various challenges when it comes to its environmental footprint and sustainability. Companies are becoming more committed to streamlining their impact on the environment. Also, the technological advancements of our time are increasing the competition within the industry and the need for integration. In this chapter, we will explore some of the pressing issues of the industry and the means that will be used in the coming years with the goal to rectify them.

SUSTAINABILITY AND DECARBONIZATION.



IMO2050 timeline.

IMO2050 timeline.

Currently, vessel operators are under pressure to reduce the environmental impact of their assets. The International Maritime Organization has set the goal to reach net zero Greenhouse Gas Emissions until 2050 (IMO2050 as the strategy is called). This strategy sets several milestones during the coming years so that shipping eventually ends up emitting zero Green House Gasses by 2050. Major milestones are the years 2030 and 2040 at which the IMO strives to reach net zero emissions by 30% and 80% respectively. Below we can see the entire timeline of the action taken by the IMO to address climate change.

ALTERNATIVE FUELS.

The use of alternative fuels is considered essential in IMO's strategy. The main types of alternative marine fuels are natural gases and biofuels along with their products. Fischer-Tropsch diesel and upgraded bio-oil via hydrothermal liquefaction can be entitled the 'most promising' alternative maritime fuels of the future, whereas HFO and LNG remain the 'most probable' to retain dominance without regulatory intervention. This suggests that for the maritime industry to transition towards sustainable alternative fuels, policymakers, governments, international organizations, and lenders must collectively align their policies to enable a more sustainable shipping industry. Not only by enforcing stricter regulations but also by providing the correct financial incentives.

LNG is a good solution, and this is also reflected by the fact that most new buildings are using dual fuel systems in order to incorporate the option of LNG. Some of the pros of LNG include cost efficiency over low sulphur marine fuels especially in regions where infrastructure is well developed and it is a fuel that has a high energy density therefore ships can travel longer distances without refuelling. On the other hand, it requires large investment for infrastructure development both on land for bunkering facilities and also on board each vessel. This is due to the fact that LNG is required to be stored in very low temperatures so as to remain liquid. Furthermore, in regions where infrastructure is underdeveloped, vessel operators will face logistical issues when it comes to supplying their vessels. Also, handling LNG requires strict safety protocols due to its flammable nature and special storage requirements. Zero carbon fuels like ammonia are also a great alternative to marine fuels but currently the technology for their commercial implementation lacks maturity. Some of their challenges for their broad implementation include the development of proper fuel storage facilities both aboard the vessels and ashore, the investment in bunkering facilities and general logistics regarding zero carbon fuels and the expansion of a reliable regulatory framework.

All in all, alternative fuels are a way of complying with IMO requirements and are a way to buy time until the development of the technology and infrastructure of zero carbon fuels is mature enough for commercial applications.

COLD IRONING.

The electrification of vessels via shore is not a new thing. Cold ironing as the practice is alternatively called has been applied on warships since the middle of the 20th century. For the time when large ships are docked at a pier, a high-voltage shore connection (HVSC) system is often used for eliminating emissions locally. This happens by limiting the use of diesel generators while at berth and by using in turn electricity produced by sources from ashore like conventional power plants and alternative sources like wind or solar energy.

Shore Side Electricity distribution station.

The pros of cold ironing are the reduction of air pollution, fuel savings, extended lifetime of a vessel's generators and the reduction of the environmental and social footprint of ports.

For reference, a feeder container ship with a gross tonnage of 14.236 and approximately 900 TEU carrying capacity will be used. As reported in her Time Charterparty, the vessel in particular has an approximate consumption of 3,5 MT of LFO per day while at port. Based on data from Resolution MEPC.245(66), for every ton of LFO consumed a staggering 3,15 tons of CO_2 are produced and emitted into the atmosphere. The daily consumption of the vessel leaves us with approximately 11 tons of CO_2 in the atmosphere around the port. That is the equivalent of the CO_2 emitted by almost 600 sport hatchbacks per 100 kilometres. Cold ironing will allow the vessel to switch off its generators which will automatically minimize the fuel required to operate them and the subsequent emissions. Furthermore, generator maintenance is scheduled based on usage meaning the hours spent under operation. Less usage means less maintenance checks and services applied, which in turn means fewer spare parts and lubricants used as well as less manhours spent on them. In the Annex of the paper, we can see in a case study conducted by Sustainable Ships the time required for a Ro-Ro ship owner to reach the break-even point of investing in Shore Side Electricity (SSE) systems aboard the vessel. Based on that report a 4 to 5 year period is required in order to see the ROI. Considering that a newly built vessel has an operational lifespan of 25-30 years, then the 4-5 years required to see ROI on cold ironing facilities aboard a vessel seems to be a good condition to make the investment from the shipowner's side provided that the vessel will call ports that have in turn SSE outlets.

Challenges of the implementation of cold ironing include the creation of a substantial legal framework, the difficulty in unifying each region's electrical grid and its unique properties, the safety concerns as well as the capital-intensive nature of these undertakings. Regarding the legal framework, it is currently underdeveloped for the implementation on passenger and cargo ships, but efforts are being made by organizations like EALING, ISO and the IEC. EALING's goal is to create a common EU harmonized and interoperable framework – from a technical, legal and regulatory point of view. ISO and IEC have worked together in order to set the Standard 80005-1 for the general requirements of High Voltage Shore Connection (HVSC) systems. High voltage outlet systems already exist on land and the legal framework regarding safety is extensive. The same has to be developed for SSE systems in order to ensure the safety of both the shore operators and each vessel's crew that handle the

relevant equipment. The European Maritime Safety Agency (EMSA) has provided guidance regarding the subject and with good focus on safety.

While alternative fuels are a good mid-term solution for minimizing emissions when underway, cold ironing is an excellent long-term solution when the vessels are at port. As demonstrated above, the benefits are evident provided that both shipowners and port facilities make the required investments for Shore Side Electricity inlets and outlets respectively.

CONTAINER TERMINAL AUTOMATION.

Automation involves three main dimensions: within the terminal (yard), its interface, and the foreland and hinterland. In a fully automated container terminal, both horizontal (quayside - yard) and vertical (stacking) operations are conducted by automated means. In semi-automated terminals, automation is applied only to the stacking yard.

Those in favour of terminal automation support that in automated terminals operations are conducted faster and safer, the environmental footprint of the facilities is reduced, and they create new job positions which are more specialized and therefore better paying. Those speaking against terminal automation support that the required investment is high and the maintenance costs that follow the implementation of automation are also elevated when compared to conventional terminals. Also, dockworker unions are a major barrier due to the subsequent loss of job positions that comes along with automation. Furthermore, there are concerns for cybersecurity. Container terminals that rely on automated vehicles, inventory management systems, and even gate operations are vulnerable to cyber threats that can disrupt terminal operations and logistics chains and thus delay the processes for several hours or even days in the worst case. An example is the ransomware attack on the Port of Rotterdam on the 30th of June 2017 when two terminals had to completely shut down operations until the issues were rectified. Nonetheless, successful automated ports show that careful planning and management can surmount these difficulties: operating expenses could fall by 25 to 55 per cent, and productivity could rise by 10 to 35 per cent, as indicated by a study from McKinsey.

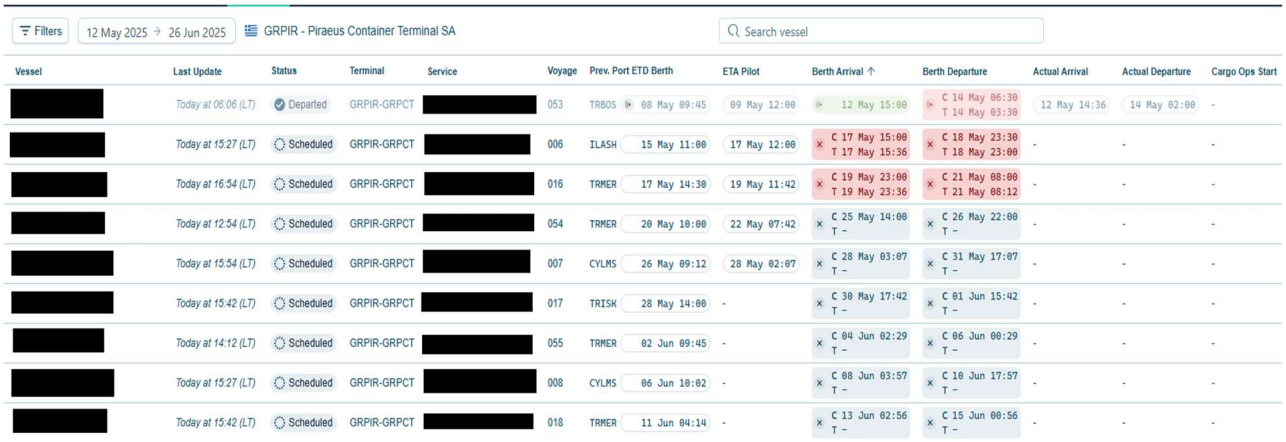
A survey conducted by Knatz et al observed 62 automated terminals which are found in 23 countries, in all continents except Africa (and Antarctica). Most of the terminals are located in Pacific Asia and Europe. New automated terminal projects have been proposed for Busan in Korea, New Orleans and Long Beach in the US and Chile, while others are under development. Stevedoring companies operate 39 automated terminals, carriers operate 14 terminals, financial holding companies operate 6, and joint ventures or Consortia operate 4. From this it is evident that terminal automation is not subject to a certain geographic region. Also, investors come from various backgrounds but are usually related with the port industry. Equipment was obtained from various suppliers. Integration and a testing period followed. The integration of the new equipment with the Terminal Operating System (TOS) was facilitated by the terminals themselves at a rate of 75% (3/4 of all terminals observed by the survey). No correlation was found between the length of the testing period and the entity which undertook the installation of the equipment. The testing periods' length varied from 2 to 37 months.

It can be proposed that with the assistance of an agent acting as technical advisor this timeframe can be compressed. The agent can accumulate data from previous projects and share insights as to how the automation integration can be accelerated. This of course while taking into consideration each terminal's unique characteristics.

THE SHIPPING AGENT'S ROLE IN THE EVOLVING SHIPPING INDUSTRY

Agents are a major part of shipping and have various forms based on the relationship they have with their principal. A ship agent is the party that represents the ship's owner and/or charterer (the Principal) in port. If so instructed, the agent is responsible to the Principal for arranging, together with the port, a berth, all relevant port and husbandry services, tending to the requirements of the master and crew, clearing the ship with the port and other authorities (including preparation and submission of appropriate documentation) along with releasing or receiving cargo on behalf of the Principal.

As mentioned in IMO's FAL Convention, one of the responsibilities of the ship agent is to arrange a berth for the vessel. This is facilitated by various communications between the



Example of the User Interface of a berth alignment platform.

agent, the terminal, the vessel's master and the vessel operator. It is evident that multiple parties are involved and without the agent acting as a hub of communications it would be difficult to arrange a berth properly. After April of 2024, the container terminal at Piraeus faced difficulties due to the rising berth waiting times instigated by the simultaneous arrivals of vessels. This lead to feeder as well as mainline containerships to be waiting days at a time until a position was available for them at the terminal's quays. Shipping is profitable when the vessels are travelling. For them to be waiting is detrimental both for the shipping company and their customers. When cargo is loaded on a vessel it has a purpose and must reach its destination on time. Consequently, a port must follow a just in time policy when it comes to berth planning. This can be facilitated if the port's agents cooperate and share information on a common platform. Below is an example of such an interface where information is shared regarding the berthing prospects at Piraeus Container Terminal of the vessels operated by a single carrier.

The agent provides the Estimated Time of Arrival (ETA) of each vessel, cargo information and the time she will be ready to start cargo operations. The terminal takes into account the information provided and gives the berthing prospects. The issue with the platform below is that the information displayed, as already mentioned, concerns the vessels of a single carrier that call Piraeus. If there was a platform where all the agents of the port could input the expected arrivals, then there would be grounds for the agencies to cooperate and synchronize the arrivals of the vessels. Waiting times would decrease and the terminal's productivity would increase. Also, because the port of Piraeus operates on a FIFO basis for feeder vessels, there would be more clarity and ease of tracking the arrivals. Operators would have better feedback regarding their competition and for making decisions regarding the speed and consequently the fuel consumption of each vessel. If a competitor is hours ahead then there is no point to speed up, waste fuel and ultimately berth later than the competition. This is just a small example of the unity that should characterize shipping agencies – working together in order to increase the value added by the provided services.

Another major activity of shipping agents is the provision of an interface between the vessel and the port's authorities. Without getting clearance from the coast guard, local customs office et cetera, berthing and the start of cargo operations cannot be facilitated. The ship agent must have good knowledge of how local authorities operate so as to provide all the necessary documents on time and also complete all the necessary procedures prior to a vessel's berth. Nowadays, clearance procedures can become simple via the implementation of IT solutions. One good example is the effort by EMSA to launch the so called Maritime Single Windows on a pan-European scale at first and then to other neighbouring nations. These single windows are platforms that provide a single interface for all procedures required by each nation's various local authorities. Documents like the crew lists which are required by immigration offices, bonded store lists which are required by customs and so on are uploaded by a specified individual who has the authority to represent the vessel on the maritime single window prior to her call to a country's port. Information about the vessel's arrival time, waste carried aboard, security level et cetera are uploaded on these platforms as well. The main aim of the EMSWe Regulation is to lay down harmonized rules for the provision of the information that is required for port calls in particular, by ensuring that the same data sets can be reported to each Maritime National Single Window in the same way. This Regulation also aims to facilitate the transmission of information between declarants, relevant authorities and the providers of port services in the port of call, and other Member States. Currently EMSA's timeframe for the total implementation of maritime single windows in the EU spans until 2027. Some might argue that such undertakings could minimize the role of the shipping agent and ultimately could lead to their extinction. However, this concern can be thwarted by two arguments. One is that the shipping agents do not only provide clearance services to their principals, but their role goes further than that. They are also the interface between the vessels' crew and a port's nearby town. Shipping agents provide services like crew changes, parcel customs clearance and delivery aboard, vessel and crew certificate renewals and quite importantly, medical assistance to the seafarers. These services are more critical and therefore enhance the agent's role to their principal. Consequently, the simplification of clearance procedures through digitalization will create room for the shipping agent to exploit other streams of income by providing services of higher value. The second is that the shipping agent usually acts as a failsafe or a mediator once things go wrong. Situations that require immediate and sometimes hands-on attention cannot be controlled from afar and without the deployment of "middlemen". For instance, if

a vessel is malfunctioning while at port then the shipping agent has to coordinate quickly with the principal in order to fix any issues prior to her departure time. A ship will be off-hire if an event occurs which is specifically mentioned in the list of events in the off-hire clause. This means that the charterer will not pay freight until the vessel is ready to continue her voyage. In addition, ports are usually charging quay idle time after cargo operations are finished therefore the timely departure of a vessel is in everyone's best interest. Imagine if such malfunctions had to be dealt with by a Shipmanagement office located in Hamburg and the vessel being located in an African port without the deployment of an agent. What does the office know about the local authorities' procedures? Do they keep contact with the local workshops? Even if they do, which workshop will provide the most competitive offer? All these questions are easily answered by the shipping agents who are deeply rooted in the ports they serve.

Even though shipping is a capital intensive industry and the aforementioned technological advancements are important, the human factor has to be considered as well. Another issue where the shipping agent can have a pivotal role is the seafarers' welfare. Actions can be taken so as to raise awareness for the issues that seafarers face. Some of them are:

- Mental health issues
- Contractual and Legal Issues
- Lack of Shore Leave

Seafarers stay away from their homes and loved ones for prolonged periods of time. This along with the demanding and often hazardous nature of their work can strain their mental condition. Agents can help raise awareness and funds via various methods like conferences, open days et cetera to combat this issue. Also, they can provide psychological support to the seafarers via certified professionals and counselling to their families. Furthermore, agents can specialize in the legal aspects of the seafarers' work contracts and help maintain their integrity. Seafarer abandonment is a serious contractual issue. According to the ITF, a total of 312 vessels were abandoned in 2024, up from 132 vessels in 2023. The general secretary of the ITF, Mr Stephen Cotton, supports that: "…the solution lies in plain sight: better regulation, enforcement and accountability from governments". This is where the shipping agent can assist at a local and regional level by raising awareness of the policy makers regarding the problem of seafarer abandonment. Also, they can inquire about the issue with the seafarers and get better insight regarding it.

All in all, the agents have crucial roles to play in shipping. From the traditional obligation of vessel clearance and the facilitation communications to more special issues like seafarer welfare and the integration of technological solutions, they can provide a plethora of services, which add value to the supply chain and assist in its optimal operation. It is argued that new technologies will minimize their role but the above prove that their activities can be multifarious and very valuable to the industry. Consequently, it can be supported that if the agents can keep their traditional business model and at the same time look to expand their services then they should not have anything to fear for the future.

CONCLUSION

- Container shipping is a major sector of the shipping industry. It started in the mid-1950s and gained traction quickly due to the benefits it provided for the transportation of goods. It decreased shipping costs and turnaround times.
- Various types of containers and supplementary devices exist today and all of them are exploited in order to cover specific transportation needs.
- Container vessels differ from other types of merchant vessels due to the special nature of the industry. Their design is optimized with speed and maximum capacity in mind.
- Currently the shipping industry is under pressure to limit its environmental footprint. IMO2050 is the summarization of the effort by the International Maritime Organization to gradually decrease vessel emissions until net zero is reached via regulatory reform.
- Regulatory compliance is very important among vessel operators and the new regulations regarding the fuels have put strain on their OPEX and have created the need for alternative fuels. These will buy the industry time until zero carbon fuels and other energy sources are mature enough for commercial use.
- Cold ironing is a good solution for decreasing the environmental footprint of vessels while at berth. Technology is mature for commercial use, but the legal framework needs to be more advanced. Also, more steps have to be taken in order to fully standardize its technical aspects. Its implementation requires long term planning due to the various stakeholders involved and the large amount of investment required.
- Terminal automation is a dividing subject. Some support the idea of fully automated terminals while others are totally against it. The stakeholders need to measure whether the benefits, like operational efficiency, outweigh the disadvantages like the required investment and the backlash from the trade unions due to the lost jobs.
- The role of the shipping agent will most likely change in the coming years along with so many other aspects of shipping. It is of utmost importance for them to find ways to add value to the supply chain. Along with the usual obligation of getting clearance, it is important to develop other services as well.
- In addition to the technological factors out there, the shipping agents have to contribute also to the human factor in shipping. They are the people who come in contact with seafarers the most and must be by their side when it comes to the troubles they face, which stem from the hardships of their peculiar yet amazing profession.

ANNEX

COLD IRONING ECONOMIC FEASIBILITY STUDY BY SUSTAINABLE SHIPS

General		
Ship name	RoRo Lets Go	
Ship type	RoRo Cargo	
Ship main type	RORO SHIPS	
Year built	-	
Drive train	Direct Drive	
Cruising speed	18.0	[knts]
GT	50,443	
Deadweight	20,615	[mT]
Displacement	-	[mT]
Cargo capacity	0	[m^3]
Length	216	[m]
Beam	33	[m]

Aux engine		
Designation	Aux name	
Aux engine power	2,300	[kW]
Aux engine type	4-Stroke	
Aux engine speed	High	
Aux engine RPM	1,200	[RPM]
Aux fuel tank volume	-	[m^3]
Aux fuel type	MDO	

Equipment		
Main switchboard voltage	6,600	[V]
Frequency	60	[Hz]

		Conventional	Shore Power	
Max. power	[kW]	920	782	-15%
Average power	[kW]	920	782	-15%
Energy required	[kWh]	22,080	18,768	-15%
Engine hours	[hrs]	24	0	-100%
Average SFC	[g/kWh]	248	0	-100%
Fuel consumption	[kg]	5,480	0	-100%
Fuel consumption	[liters]	6,157	0	-100%

Fuel	[€]	€ 4,802	€ 4,703	-2%
Lease / rental	[€]	€ 0	€ 0	-
Maintenance	[€]	€ 480	€ 82	-83%
Spares / consumables	[€]	€ 48	€ 39	-20%
EU ETS	[€]	€ 1,142	€ 114	-90%
FuelEU	[€]	€ 1,104	€ 297	-73%
OPEX Total	**daily**	**€ 7,576**	**€ 5,234**	**-31%**

Generalized economic assesment		
CAPEX	€ 979,200	[€]
Dayrate	- € 2,342	[€/day]
Payback days	418	[days moored]
Shore power days	72	[per/year]
Inflation	3%	
Resulting payback years	4	[years]

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Figure 05, Chapter 2. Reefer container refrigeration unit.

Figure 06, Chapter 2. Flat rack container.

Figure 07, Chapter 2. Open top container.

Figure 08, Chapter 2. Tank container.

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Figure 11, Chapter 3. Vessel fuel consumption as a function of speed.

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Figure 17, Chapter 5. Example of the UI of a berth alignment platform.

Portchain berth alignment platform.

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THE ROLE OF SHIP AGENTS IN ENHANCING PORT EFFICIENCY IN A DIGITAL AND SUSTAINABLE ERA

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INTRODUCTION

The global shipping industry is the backbone of international trade, responsible for transporting over 90% of the world's goods by volume. From raw materials like oil and iron ore to finished products such as electronics and clothing, the movement of cargo across oceans connects economies, supports industries, and ensures the availability of goods worldwide. However, the industry is undergoing a period of profound transformation, driven by digitalization, sustainability goals, and evolving regulatory frameworks. In this dynamic environment, ship agents have emerged as critical players in ensuring the smooth operation of ports and the efficient movement of vessels and cargo. Ship agents act as intermediaries between shipowners, port authorities, and various service providers, handling a wide range of responsibilities that are essential to port operations. These include vessel clearance, cargo coordination, compliance with regulatory requirements, and communication between stakeholders. Despite their crucial role, ship agents face numerous challenges, including regulatory complexity, operational delays, and the pressure to adopt new technologies. At the same time, the rapid pace of digitalization and the growing emphasis on sustainability present both opportunities and challenges for the profession. This paper explores the evolving role of ship agents in enhancing port efficiency, with a particular focus on the challenges and opportunities presented by digitalization and sustainability. By analysing the key responsibilities of ship agents, identifying the main challenges they face, and examining the potential of digital technologies to transform their operations, this paper aims to provide valuable insights for industry professionals and contribute to the broader discourse on port efficiency and sustainability.

A- Key Responsibilities of Ship Agents Ship agents are the linchpins of port operations, performing a wide range of tasks that ensure the smooth movement of vessels and cargo. Their responsibilities can be broadly categorized into four main areas: vessel clearance and documentation, cargo coordination and logistics, compliance with regulatory requirements, and crisis management.

VESSEL CLEARANCE AND DOCUMENTATION

One of the primary responsibilities of ship agents is to facilitate the clearance of vessels entering and leaving ports. This involves coordinating with port authorities, customs officials, and other relevant agencies to ensure that all necessary documentation is in order. Ship agents must be well-versed in the legal and regulatory requirements of the ports they operate in, as well as the international conventions that govern maritime trade. For example, in the Port of Singapore, one of the busiest ports in the world, ship agents are required to submit a wide range of documents, including the ships manifest, cargo declaration, and crew list, to the Maritime and Port Authority (MPA) for clearance.

Failure to provide accurate and timely documentation can result in delays, fines, or even the detention of the vessel. Ship agents must therefore have a thorough understanding of the documentation requirements and be able to navigate the complexities of the clearance process.

CARGO COORDINATION AND LOGISTICS

Ship agents also play a crucial role in coordinating the loading and unloading of cargo. This includes liaising with cargo owners, port operators, and stevedores to ensure that cargo is handled efficiently and in accordance with the terms of the charter party or bill of lading. Ship agents must also manage the logistics of cargo movement, including the arrangement of transportation to and from the port. In the Port of Rotterdam, for example, ship agents work closely with terminal operators to coordinate the loading and unloading of containers, bulk cargo, and liquid cargo. They must ensure that cargo is handled safely and efficiently, minimizing the risk of damage or delays. This requires strong organizational skills and the ability to manage multiple tasks simultaneously. In the Port of Rotterdam, for example, ship agents work closely with terminal operators to coordinate the loading and unloading of containers, bulk cargo, and liquid cargo. They must ensure that cargo is handled safely and efficiently, minimizing the risk of damage or delays. This requires strong organizational skills and the ability to manage multiple tasks simultaneously.

COMPLIANCE WITH REGULATORY REQUIREMENTS

Compliance with regulatory requirements is another key responsibility of ship agents. This includes ensuring that vessels meet all safety and environmental standards, as well as complying with customs and immigration regulations. Ship agents must stay up to date with the latest regulatory changes and ensure that their clients are aware of any new requirements that may affect their operations. For example, the International Maritime Organization (IMO) has introduced a number of regulations aimed at reducing the environmental impact of shipping, including the IMO 2020 sulfur cap and the upcoming Carbon Intensity Indicator (CII) regulations. Ship agents must ensure that vessels comply with these regulations, which may involve coordinating with fuel suppliers, arranging for the installation of emissions reduction technologies, or providing documentation to prove compliance.

CRISIS MANAGEMENT

In addition to their day-to-day responsibilities, ship agents must also be prepared to handle crises and emergencies. This may include responding to accidents, such as collisions or groundings, or dealing with security threats, such as piracy or terrorism. Ship agents must have contingency plans in place to ensure that they can respond quickly and effectively to any crisis that may arise. For example, in the event of a collision, ship agents may be required to coordinate with salvage companies, insurance providers, and legal advisors to resolve the situation. They must also communicate with the shipowner, cargo owners, and port authorities to ensure that all parties are kept informed of the situation and that the necessary actions are taken to minimize the impact on port operations.

HUMAN FACTOR AND SOFT SKILLS

In a world where technology and regulations are becoming more important every day, we must not forget the value of human skills in the ship agent's job. Soft skills like communication, conflict resolution, and cultural awareness are now just as important as technical knowledge. In a world where technology and regulations are becoming more important every day, we must not forget the value of human skills in the ship agent's job. Soft skills like communication, conflict resolution, and cultural awareness are now just as important as technical knowledge. Ship agents often work under pressure for example, when a vessel is delayed or when something unexpected happens at the port. In these situations, knowing the rules is not enough. The agent's attitude, calmness, and ability to solve problems with others can make a big difference. Agents also deal with many different cultures from ship crews to customs officers and port staff. Being able to understand different ways of speaking, working, or reacting is essential. A good agent is someone who can build trust, adapt to others, and make sure everything runs smoothly, even in stressful moments. In short, being a successful ship agent today means not only knowing the job well but also knowing people well.

CHALLENGES FACED BY SHIP AGENTS

Despite their critical role in port operations, ship agents face a number of challenges that can hinder their ability to perform their duties effectively. These challenges include regulatory complexity, operational delays, communication gaps, and the pressure to adopt new technologies.

REGULATORY COMPLEXITY

The shipping industry is subject to a wide range of regulations, both at the national and international levels. These regulations cover everything from safety and environmental standards to customs and immigration procedures. For ship agents, keeping up with the latest regulatory changes can be a daunting task, particularly when operating in multiple jurisdictions with different legal frameworks. For example, the European Union (EU) has introduced a number of regulations aimed at reducing the environmental impact of shipping, including the EU Emissions Trading System (ETS) and the Sulphur Directive. Ship agents operating in EU ports must ensure that vessels comply with these regulations, which may involve coordinating with fuel suppliers, arranging for the installation of emissions reduction technologies, or providing documentation to prove compliance. For example, the European Union (EU) has introduced a number of regulations aimed at reducing the environmental impact of shipping, including the EU Emissions Trading System (ETS) and the Sulphur Directive. Ship agents operating in EU ports must ensure that vessels comply with these regulations, which may involve coordinating with fuel suppliers, arranging for the installation of emissions reduction technologies, or providing documentation to prove compliance.

OPERATIONAL DELAYS

Operational delays are a common challenge in port operations, often caused by factors such as adverse weather conditions, equipment failures, or labour disputes. These delays can have a significant impact on the efficiency of port operations and can result in additional costs for shipowners and cargo owners. Ship agents must be adept at managing these delays and finding solutions to minimize their impact. For example, in the Port of Los Angeles, one of the busiest ports in the United States, ship agents often face delays due to congestion and labour shortages. To address this issue, ship agents may work with port authorities to prioritize the berthing of certain vessels or arrange for additional labour to be brought in to handle cargo.

COMMUNICATION GAPS

Effective communication is essential for the smooth operation of port activities, but communication gaps between stakeholders can often lead to misunderstandings and inefficiencies. Ship agents must navigate these communication gaps and ensure that all parties are kept informed of any developments or issues that may arise. For example, in the Port of Shanghai, ship agents often face challenges in communicating with cargo owners and port authorities due to language barriers and cultural differences. To overcome these challenges, ship agents may employ multilingual staff or use translation tools to facilitate communication.

PRESSURE TO ADOPT NEW TECHNOLOGIES

The rapid adoption of digital technologies in the shipping industry has created both opportunities and challenges for ship agents. While these technologies offer the potential to improve efficiency and reduce costs, they also require ship agents to acquire new skills and adapt to new ways of working. This can be particularly challenging for smaller agencies with limited resources.

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THE ROLE OF SHIP AGENTS IN CRISIS RECOVERY AND BUSINESS CONTINUITY

In the maritime industry, unexpected events such as pandemics, natural disasters, or political instability can severely disrupt port operations. In such times, ship agents are essential not only for maintaining operations but also for helping the industry recover.

For example, during the COVID-19 pandemic, many ships faced restrictions on crew changes, cargo handling, and port access. Ship agents played a key role in managing emergency communications, organizing alternative logistics, and providing support to shipowners and port authorities. Their ability to adapt quickly and find practical solutions helped minimize economic losses and maintain trade flows. Ship agents are often the first to respond to a crisis and the last to leave once normal operations resume. Their knowledge of local infrastructure, relationships with port stakeholders, and quick decision-making are vital for ensuring continuity. In future crises whether health-related, environmental, or geopolitical the role of ship agents will be even more strategic. To prepare for such scenarios, agencies should invest in business continuity plans, conduct simulations, and train staff in emergency response. Flexibility and preparedness will be essential for navigating future disruptions.

DIGITALIZATION IN SHIP AGENCY OPERATIONS

The shipping industry is undergoing a digital revolution, with new technologies transforming the way ports and ship agents operate. Digitalization offers ship agents the opportunity to streamline their operations, improve efficiency, and reduce costs. In this section, we will explore some of the key technologies that are reshaping the role of ship agents, including Electronic Data Interchange (EDI), blockchain, and Artificial Intelligence (AI). The shipping industry is undergoing a digital revolution, with new technologies transforming the way ports and ship agents operate. Digitalization offers ship agents the opportunity to streamline their operations, improve efficiency, and reduce costs. In this section, we will explore some of the key technologies that are reshaping the role of ship agents, including Electronic Data Interchange (EDI), blockchain, and Artificial Intelligence (AI).

ELECTRONIC DATA INTERCHANGE (EDI)

Electronic Data Interchange (EDI) is a technology that allows for the electronic exchange of documents between different stakeholders in the shipping industry. For ship agents, EDI can significantly reduce the time and effort required to process paperwork, such as bills of lading, customs declarations, and port clearance documents. By automating these processes, EDI can help ship agents improve accuracy, reduce errors, and speed up the flow of information between stakeholders.

CASE STUDY: PORT OF ROTTERDAM

The Port of Rotterdam, one of the busiest ports in Europe, has implemented an EDI system that allows ship agents to submit and receive documents electronically. This has reduced the time required for vessel clearance from several hours to just a few minutes, significantly improving port efficiency. Ship agents operating in Rotterdam have reported that the EDI system has not only saved them time but also reduced the risk of errors and delays caused by manual data entry.

BLOCKCHAIN TECHNOLOGY

Blockchain is another technology that has the potential to revolutionize the shipping industry. Blockchain is a decentralized digital ledger that records transactions in a secure and transparent manner. For ship agents, blockchain can be used to track the movement of cargo, verify the authenticity of documents, and ensure compliance with regulatory requirements.

CASE STUDY: MAERSK AND IBMS TRADELENS

Maersk, one of the worldÕs largest shipping companies, has partnered with IBM to develop TradeLens, a blockchain-based platform that allows stakeholders in the shipping industry to share information in real-time. Ship agents using TradeLens can track the movement of cargo from the point of origin to the final destination, ensuring that all parties have access to accurate and up-to-date information. This has reduced the time and cost associated with manual document verification and has improved transparency in the supply chain.

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ARTIFICIAL INTELLIGENCE (AI)

Artificial Intelligence (AI) is also making its mark on the shipping industry, with applications ranging from predictive analytics to automated decision-making. For ship agents, AI can be

used to analyse large volumes of data, such as weather patterns, port congestion, and vessel schedules, to make more informed decisions and optimize operations.

CASE STUDY: AI-POWERED PORT OPERATIONS IN SINGAPORE

The Port of Singapore, one of the busiest ports in the world, has implemented an AI-powered system that predicts vessel arrival times and optimizes berth allocation. Ship agents in Singapore have reported that the system has reduced waiting times for vessels and improved the overall efficiency of port operations. By leveraging AI, ship agents can better anticipate potential delays and take proactive measures to mitigate their impact.

CYBERSECURITY IN THE DIGITAL ERA

As ports and shipping become more digital, cybersecurity is a new and growing concern for ship agents. Port systems, logistics platforms, and digital documents are all connected which is great for speed and efficiency but also creates risks. Agents need to make sure that the documents they send or receive are protected and safe. There have already been cyberattacks that shut down entire companies or port operations Ñ for example, the 2017 ransomware attack on Maersk. This shows how important it is to protect digital systems. Small agencies are especially vulnerable because they may not have IT experts or strong digital systems. That is why it is so important for agents to learn the basics: strong passwords, secure internet connections, and awareness of fake emails or

suspicious links. A single click on a dangerous email can create serious problems in the whole supply chain. Cybersecurity may seem like a technical subject, but it is now a real part of the ship agent’s job. Being prepared is not optional anymore, it’s necessary. A single click on a dangerous email can create serious problems in the whole supply chain. Cybersecurity may seem like a technical subject, but it is now a real part of the ship agentÕs job. Being prepared is not optional anymore it is necessary.

ENVIRONMENTAL REGULATIONS AND SUSTAINABILITY

As the shipping industry faces increasing pressure to reduce its environmental impact, ship agents are playing a key role in helping their clients comply with new regulations and adopt more sustainable practices. In this section, we will explore the impact of environmental regulations on ship agents and how they can support greener shipping practices.

IMPACT OF ENVIRONMENTAL REGULATIONS

The International Maritime Organization (IMO) has introduced a number of regulations aimed at reducing the environmental impact of shipping, including the IMO 2020 sulphur

cap and the upcoming Carbon Intensity Indicator (CII) regulations. These regulations require shipowners to reduce their emissions and adopt more sustainable practices, which in turn places additional responsibilities on ship agents.

ROLE OF SHIP AGENTS IN FACILITATING COMPLIANCE

Ship agents play a crucial role in helping shipowners comply with environmental regulations. This includes ensuring that vessels have the necessary documentation, such as bunker delivery notes and emissions reports, and coordinating with port authorities to ensure that vessels meet local environmental standards. Ship agents must also stay up to date with the latest regulatory changes and advise their clients on how to comply with new requirements.

PROMOTING SUSTAINABLE PORT OPERATIONS

In addition to facilitating compliance with environmental regulations, ship agents can also play a role in promoting sustainable port operations. This includes working with port authorities to reduce emissions from port activities, such as cargo handling and vessel berthing, and encouraging the use of cleaner fuels and energy-efficient technologies.

CASE STUDY: GREEN PORT INITIATIVES IN EUROPE

Several ports in Europe, including the Port of Hamburg and the Port of Antwerp, have implemented green port initiatives aimed at reducing their environmental impact. Ship agents operating in these ports have been instrumental in promoting sustainable practices, such as the use of shore power for vessels at berth and the adoption of electric vehicles for cargo handling. These initiatives have not only reduced emissions but also improved the overall efficiency of port operations.

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EMBRACING SUSTAINABILITY BEYOND COMPLIANCE

Sustainability is not just about meeting regulations, it is about creating lasting value for communities, customers, and the planet. Many ship agents are now taking a more proactive role in promoting sustainable practices that go beyond compliance. For example, some agencies are working with local governments to support biodiversity near ports, reduce noise pollution, and support social programs for port workers. Others are helping clients offset carbon emissions through verified programs or promote sustainable fuels. Digital tools can also support sustainability by optimizing routes, reducing waiting times, or managing waste more efficiently. Agents who embrace this mindset can become leaders in environmental innovation and set new standards for

the industry. In the years ahead, clients will increasingly favour partners who demonstrate real environmental responsibility. For ship agents, sustainability is more than a duty it's an opportunity to lead with purpose.

RECOMMENDATIONS FOR SHIP AGENTS

To remain competitive in a rapidly changing industry, ship agents must adapt to new technologies, build stronger partnerships, and embrace sustainability. In this section, we will provide practical recommendations for ship agents to enhance their operations and stay ahead of the curve.

INVEST IN DIGITAL SKILLS AND TRAINING

As digital technologies continue to transform the shipping industry, ship agents must invest in digital skills and training to stay relevant. This includes learning how to use new tools and platforms, such as EDI, blockchain, and AI, and understanding how these technologies can be applied to improve efficiency and reduce costs.

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BUILD STRONGER PARTNERSHIPS WITH PORT STAKEHOLDERS

Effective collaboration with port stakeholders, including port authorities, cargo owners, and service providers, is essential for the smooth operation of port activities. Ship agents should

focus on building stronger partnerships with these stakeholders, fostering open communication and mutual trust.

ADAPT TO NEW MARKET TRENDS

The shipping industry is constantly evolving, with new market trends emerging all the time. Ship agents must stay informed about these trends and be prepared to adapt their operations accordingly. This includes keeping up to date with the latest regulatory changes, technological advancements, and customer expectations.

LEVERAGE TECHNOLOGY TO IMPROVE COMMUNICATION AND OPERATIONAL EFFICIENCY

Technology can play a key role in improving communication and operational efficiency for ship agents. By adopting digital tools and platforms, ship agents can streamline their operations, reduce errors, and improve the flow of information between stakeholders.

ROLE OF SHIP AGENTS IN CREW WELFARE AND HUMANITARIAN SUPPORT

Crew members are at the heart of every maritime operation, yet their well-being is often overlooked. Ship agents play a vital role in ensuring the welfare of seafarers, especially during port calls and emergency situations. One of the key responsibilities includes assisting with shore leave, medical access, and crew changes. These tasks became especially complex during the COVID-19 pandemic, when border closures and quarantine rules stranded thousands of seafarers at sea. In such cases, ship agents stepped in to coordinate humanitarian support, liaise with health authorities, and arrange safe accommodations and transportation. One of the key responsibilities includes assisting with shore leave, medical access, and crew changes. These tasks became especially complex during the COVID-19 pandemic, when border closures and quarantine rules stranded thousands of seafarers at sea. In such cases, ship agents stepped in to coordinate humanitarian support, liaise with health authorities, and arrange safe accommodations and transportation. Crew welfare is not only a moral obligation but also a practical necessity. A well-rested, healthy, and motivated crew contributes to safer and more efficient shipping operations. Ship agents can help foster this by ensuring that ship personnel have access to local services, food, internet connectivity, and the chance to contact family, all of which are essential for morale.

In future, ship agents may be called upon to support psychological care, vaccination logistics, or emergency repatriations. Agencies should be trained in these aspects and collaborate closely with welfare organizations like the International Seafarers Welfare and Assistance Network (ISWAN). Supporting crew members is more than a service Ñ it is a sign of professionalism and humanity in modern shipping.

ENHANCING CRISIS COMMUNICATION AND STAKEHOLDER COORDINATION

In times of crisis, clear and efficient communication becomes paramount. Ship agents must act as the central communication hub between various stakeholders such as shipowners, port authorities, customs, and logistics providers. Miscommunication or delayed information can exacerbate operational disruptions and increase costs. To enhance crisis communication, ship agents should develop comprehensive communication protocols that include rapid notification systems, designated points of contact, and real-time information sharing platforms. Leveraging digital tools such as instant messaging apps, cloud-based document sharing, and video conferencing can facilitate faster and more transparent interactions. Moreover, agents must foster strong relationships with all parties involved, building trust and mutual understanding before a crisis occurs. Regular drills and scenario planning with stakeholders can improve readiness and help identify communication gaps. By improving communication and coordination during emergencies, ship agents can significantly reduce downtime, ensure safety, and maintain the flow of goods, thereby safeguarding the port's reputation and economic stability. By improving communication and coordination during emergencies, ship agents can significantly reduce downtime, ensure safety, and maintain the flow of goods, thereby safeguarding the port's reputation and economic stability.

CONCLUSION

The role of ship agents in enhancing port efficiency has never been more important. As the shipping industry continues to evolve, ship agents must adapt to new challenges and opportunities, leveraging digital technologies and embracing sustainability to stay competitive. By investing in digital skills, building stronger partnerships, and staying informed about new market trends, ship agents can not only improve their own operations but also contribute to the broader goal of creating a more efficient and sustainable shipping industry.

In conclusion, the future of ship agency lies in innovation and collaboration. By embracing change and working together with port stakeholders, ship agents can play a key role in shaping the future of the shipping industry.

THE GROWING IMPORTANCE OF ETHICS AND TRANSPARENCY

As the maritime industry becomes more regulated and interconnected, ethics and transparency are becoming essential elements of the ship agent's role. Ship agents handle sensitive information, large sums of money, and communication between many parties making trust and accountability critical.

Corruption, favouritism, or lack of transparency can damage not only an agent's reputation, but also the integrity of port operations. That is why more shipping companies and port authorities are expecting agents to follow ethical guidelines and demonstrate clear reporting practices. Being transparent about costs, timelines, and procedures builds long-term trust with clients and stakeholders. Many agencies are now adopting codes of conduct, internal audits, and training in ethical practices. These steps not only reduce the risk of legal issues but also strengthen professional relationships. Ship agents must see themselves not just as service providers, but as responsible players in a global system. Operating with integrity is no longer optional and it is a competitive advantage.

OUTLOOK: SHAPING THE SHIP AGENT OF TOMORROW

The future of ship agents will be shaped by both tradition and innovation. On one hand, the basics of the job Ñ coordination, organization, people skills Ñ will always matter. On the other hand, technology, environmental rules, and world events will keep changing how the job is done. New trade routes in the Arctic, more business in Africa and Central Asia, and the push toward green energy will bring new opportunities and new challenges. Ship agents will need to watch these changes closely and even get ahead of them. The agencies that focus on ongoing training, strong teamwork, and risk management will be the ones that succeed. Being curious, flexible, and open to change will be the key qualities of tomorrow's best agents. In short, the ship agent of the future won't just follow change, they will lead it. And that leadership starts now, by investing not only in better tools, but in better people. Future Challenges for the Ship Agent Profession: As the shipping industry evolves, ship agents will face new and more complex challenges. One of the most significant is the growing demand

for digital traceability. Clients, governments, and the public increasingly expect full transparency in cargo movements, compliance records, and carbon emissions. Ship agents will need to master digital reporting systems and manage sensitive data responsibly. Another challenge is global instability. Geopolitical tensions, port strikes, pandemics, and climate change are disrupting shipping routes and port access. Agents will need to act not only as coordinators but as risk managers who can react quickly and help vessels reroute, change schedules, or find new suppliers. There is also increasing pressure on agents to prove their value. With automation advancing, some companies are asking: Do we still need human agents? The answer is yes, but only if agents can evolve. Providing customized services, strong problem-solving skills, and excellent communication will be key to standing out. To stay ahead, future ship agents must think beyond operations. They must embrace innovation, understand global trade dynamics, and act as trusted advisors for shipowners, charterers, and port stakeholders. The job is no longer just about paperwork it is about leadership in a fast-changing world. To stay ahead, future ship agents must think beyond operations. They must embrace innovation, understand global trade dynamics, and act as trusted advisors for shipowners, charterers, and port stakeholders. The job is no longer just about paperwork; it's about leadership in a fast-changing world.

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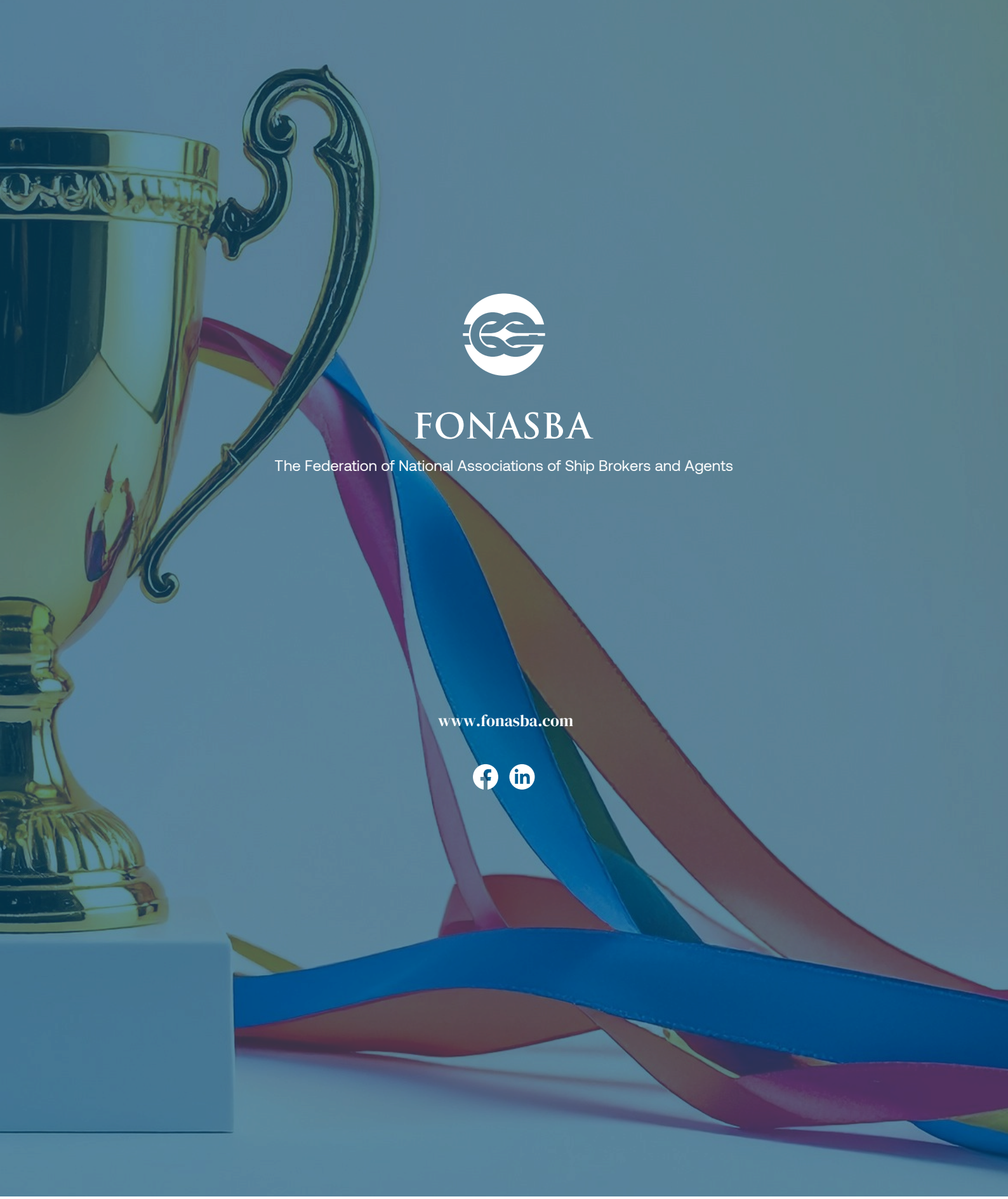

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