



**Towards Sustainable Shipping - The adoption of
UN's Sustainable Development Goals (SDGs)
in the maritime container shipping industry**

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Abstract

The shipping industry is of significant importance in achieving the global sustainable development goals (SDGs) adopted by the United Nations (UN) in 2015, also referred to as Agenda 2030. This paper sets out to determine the state of engagement to these goals by shipping companies and to identify the main barriers and levers affecting the integration into their business. Reviewing sustainability reports from thirteen major container line operators for the financial year 2021 reveals a rather disappointing level of effort in response to the Agenda 2030 objectives. Overall, the sector focuses on a few goals related to environmental impact, education, work and economic development (SDGs 13, 14, 8, 4). However, the analysis revealed an insubstantial level of SDG engagement for the industry derived from the predominantly superficial nature of the disclosed information, the gap between intentions and actions taken, and the marginal use of specific progress assessments, performance indicators, and measurable targets. Supplementary interviews with industry experts confirmed moderate commitment driven by stakeholder expectations but limited attention to the SDGs, mainly for practical reasons. While stating a high probability of not achieving the defined longer-term targets, practitioners call for tightened and globally aligned environmental regulations of the sector, financial incentives for sustainability performance, suitable frameworks including KPIs and compulsory SDG-related reporting guidelines aligned to the industry. This empirical study sheds light on the commitment to the Agenda 2030 at the organizational level and contributes to the sparse literature on sector-specific adoption of the Sustainable Development Goals.

Keywords: SDG, Sustainable Development Goals, sustainable shipping, sustainability disclosure, shipping companies

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Abstrato

O transporte marítimo tem uma importância significativa para se poder alcançar os Objetivos de Desenvolvimento Sustentável (ODS) adotados pela Organização das Nações Unidas (ONU) em 2015, conhecidos como Agenda 2030. Este documento pretende determinar o grau de compromisso das empresas de navegação com esses objetivos e identifica as principais barreiras e impulsionadores que afetam seus negócios. A análise dos relatórios de sustentabilidade de treze grandes operadoras de linhas de contêineres em 2021 revela um esforço decepcionante em relação aos objetivos da Agenda 2030.

O setor geralmente concentra-se em alguns objetivos relacionados ao impacto ambiental, educação, trabalho e desenvolvimento econômico (ODS 13, 14, 8, 4). No entanto, a análise revela um envolvimento superficial com os ODS na indústria, com informações divulgadas predominantemente superficiais, uma lacuna entre intenções e ações e um uso limitado de avaliações de progresso específicas, indicadores de desempenho e metas mensuráveis.

As entrevistas suplementares realizadas a especialistas do setor confirmaram um compromisso moderado, impulsionado pelas expectativas das partes interessadas, mas uma atenção limitada aos ODS, principalmente por razões práticas. Embora afirmem uma alta probabilidade de não atingir as metas de longo prazo definidas, os profissionais pedem regulamentações ambientais mais rígidas e globalmente alinhadas para o setor, incentivos financeiros para o desempenho de sustentabilidade, estruturas de reporte adequadas, incluindo KPIs e diretrizes obrigatórias de relatórios relacionados com ODS. Este estudo empírico lança luz sobre o compromisso com a Agenda 2030 a nível organizacional e contribui para a escassa literatura sobre a adoção setorial dos Objetivos de Desenvolvimento Sustentável.

Palavras-chave: ODS, Objetivos de Desenvolvimento Sustentável, transporte marítimo sustentável, relatórios de sustentabilidade, empresas de navegação

Título: “Rumo a um transporte marítimo sustentável - A adoção dos Objetivos de Desenvolvimento Sustentável (ODS) das Nações Unidas no setor do transporte marítimo de contentores”

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List of Abbreviations

CO ₂	Carbon Dioxide
CSR	Corporate Social Responsibility
ESG	Environmental, Social, Governance
ETS	Emission Trading System
EU	European Union
EU-MRV	EU regulation on the monitoring, reporting, and verification of carbon dioxide (CO ₂) emissions from ships
GHG	Green House Gas
GRI	Global Reporting Initiative
IMO	International Maritime Organization
KPI	Key Performance Indicator
MARPOL	International Convention for the Prevention of Pollution from Ships
MLC	Maritime Labour Convention
MSI	Private Multi-Stakeholder Initiative
NGO	Non-governmental Organization
SASB	Sustainability Accounting Standards Board
SDG	Sustainable Development Goal
SOLAS	International Convention for the Safety of Life at Sea
SR	Sustainability Reporting
TBL	Triple Bottom Line
TEU	Twenty-foot Equivalent Unit (container size)
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNGC	United Nations Global Compact

1 Introduction

In the face of ecological and humanitarian crises, the pursuit of sustainability is a pressing global imperative. The United Nations' Sustainable Development Goals (SDGs) are the most recent encompassing framework towards a more sustainable future. They address the global community's most pressing challenges to ensure economic welfare, environmental quality, social cohesion and prosperity for future generations. The SDGs apply to state and private actors across all levels. They have encouraged a renewed engagement and critical reflection of what it means to do business sustainably across numerous sectors.

The maritime industry occupies a key role in the global economy. Liner shipping accounts for over 80% of the global trade volume and impacts areas ranging from stable supply chains to global food security (UNCTAD, 2022). Consequently, the sector operates at the heart of multiple sustainability challenges. Its shipping fleet account for a steadily growing share of almost 3% per cent of all global CO₂ emissions and significantly contributes to global water pollution (IMO, 2021). Seafarers' rights and working conditions are insufficiently protected, and the sector faces economic challenges from its dependence on fossil fuels (Koilo, 2019; SSI, 2022). However, the shipping industry offers the most efficient forms of freight transport with a gradually shrinking carbon intensity (IMO, 2021). Action towards greater sustainability is thus a major concern for multiple aspects of the industry, facing operational change challenges and technological innovation (Psaraftis & Zachariadis, 2019).

The shipping industry's global impact and importance for international trade make it a vital stakeholder in achieving these goals. It is a major contributor to current challenges, and its operations concern all three dimensions of economic, social, and environmental sustainability (Benamara et al., 2019). Increasing awareness has spurred interest in a sustainable shipping model, bringing together concerns for economic feasibility and social and environmental impact mitigation (Papandreou et al., 2021). Despite growing awareness and its central relevance for global sustainability, the shipping sector has a mixed track record in its contributions (Avrampou et al., 2019). Transformative action towards sustainability has been rare, and sustainability reporting remains marginal (Karagiannis et al., 2022). There is a growing recognition that the industry must better align existing practices with the SDGs to mitigate its environmental and social impact and contribute to the broader sustainability agenda (Fasoulis & Rafet, 2019).

While most of the largest companies in the shipping sector report on their sustainability efforts, the structure and quality of that reporting remain inconsistent. The comprehensive nature of the SDGs and the prevalence of other reporting criteria makes it difficult to compare the commitment and action of companies towards these goals. Scholars noted the lack of empirical studies and a general understanding of corporate commitment to the SDGs (Bebbington & Unerman, 2018; van der Waal & Thijssens, 2020). In order to fill this gap, this research examines the characteristics of engagement with the SDGs of global shipping companies by addressing two research questions:

RQ1: what is the state of engagement with the SDGs within the shipping sector?

RQ2: What are the barriers and levers obstructing or driving this engagement?

With the first research question, we seek to understand how and to what extent shipping companies adopt and commit to goals from the Agenda 2030. The second research question examines the main barriers and levers for increased adoption. Answering this question will highlight reasons for the current level of adoption and point towards actions that could increase adoption in the future.

The paper's discussion will contribute to a growing body of research on the adoption of sustainability disclosures and the relevance of SDGs in the maritime industry. It will provide valuable insights into the industry-wide level and commitment quality and relate the findings to factors driving or hindering further SDG adoption. Understanding how the shipping industry embraces these goals will provide a more sector-specific assessment of SDG engagement.

The remainder of this paper proceeds as follows: Chapter 2 will provide the theoretical background of the study subject, introducing sustainable shipping, sustainability disclosure practises, the SDGs and their implementation in the maritime industry, and an overview of relevant prior research. Following an explanation of the methodology applied in this research in chapter 3, chapter 4 presents the findings from the analysis and interviews and summarises how our research constructs are related. Chapter 5 discusses the findings and offers recommendations to strengthen SDG engagement. Finally, chapter 6 concludes this paper's contents, explains this study's limitations, and proposes avenues for future research.

2 Background and Prior Research

This chapter presents the theoretical background for the study. First, it introduces the relevance of sustainable shipping and its challenges, followed by the state of sustainability disclosures and the relevance of the SDGs goals for the shipping industry. Section four discusses the regulatory framework before the last section gives an overview of prior research on the adoption of sustainability measures.

2.1 Sustainable Shipping

Sustainability is not a new issue but one that was addressed decades ago. The concept is often dated to the 1987 report by the United Nations' Brundtland Commission, which coined the idea of sustainable development as *“development that meets the needs of the present without compromising the ability of future generations to meet their own needs”* (WCED, 1987). Since its inception, sustainability research has focused on the interaction between three related dimensions of economic, social, and environmental sustainability (Basiago, 1998). These three interlinked aspects gained traction in industry and academia as the triple bottom line (TBL) (Elkington & Rowlands, 1999). Its social and environmental dimensions focus on reducing impact, while the economic dimension ensures viability and improved market outcomes (Somsuk & Laosirihongthong, 2017). In addition to mitigation, sustainability can encourage the transformation and improvement of systems across all three dimensions (Mensah & Enu-Kwesi, 2019). Within businesses, sustainability is often referred to as Corporate Social Responsibility (CSR), the *“responsibility of an organisation for the impacts of its decisions and activities on society and the environment, through transparent and ethical behaviour”* (ISO, 2010, as cited in, 2019, sec. Introduction). It requires shifting from a profit-focused business model to one that incorporates all aspects of the triple bottom line (Strand, 2015; Van Duuren et al., 2016).

The concept of 'sustainable shipping' has gained traction within the wider emergence of Corporate Social Responsibility and captures a broader range of issues than that of environmentally focused 'green shipping' (see Moshiul et al., 2021). Sustainable shipping involves meeting the needs of the present without compromising the ability of future generations to meet their own needs. It requires shipping companies to balance their economic, social, and environmental performances. The concept is used in practice and academia to address pressing challenges (Koberg & Longoni, 2019; Papandreou et al., 2021). The shipping industry significantly impacts all three dimensions of the triple bottom line, making it a crucial actor in advancing global

sustainability (Bao & Wang, 2020). Across all three dimensions, it faces sustainability challenges, including greenhouse gas (GHG) emissions and water pollution (Koilo, 2019), sewage and cargo spills or damage to coastal environments, and noise pollution (Parviainen et al., 2018). The ship construction, operation, and disposal also consume large amounts of raw material and energy, causing environmental problems (Andersson et al., 2016). Despite little public scrutiny, shipping risks highly visible disasters (Lister, 2015). In addition to environmental challenges, shipping companies face various social challenges, including tax and regulatory avoidance (Parviainen et al., 2018), corruption and bribe-seeking (Lee et al., 2019) or threats of piracy and illicit trafficking (Andersson et al., 2016). The industry also contends with gender-based discrimination in its workforce (Carballo Piñeiro & Kitada, 2020) and insufficient protection of workers' rights for many seafarers (Fotteler et al., 2018; Lee et al., 2022).

Challenges across all three dimensions of sustainability are closely connected because of the sector's outsized importance and its interfacing with large parts of the global supply chain. They can thus not be considered in isolation (Alamouh et al., 2021). For example, reducing fuel consumption through technological upgrades can reduce CO₂ emissions (environmental) and improve operational efficiency (economic) (Lirn et al., 2014). As multiple industry challenges are pressing and interrelated, sustainable shipping is recognised as one of the biggest challenges of the 21st century (Lirn et al., 2014). Because of the urgency of the challenge, industry stakeholders, regulators and scholars are working to provide concrete and unified frameworks for sustainable shipping (Xue & Lai, 2023).

2.2 Sustainability Disclosure Practices

Despite these apparent challenges and the growing importance of sustainability in the maritime industry, reporting on CSR is still not widespread (Karagiannis et al., 2022). Corporate reporting on sustainability has existed since the 1970s but has become increasingly sophisticated and widespread, especially since the 1990s (Hahn & Kühnen, 2013). As of 2020, 80% of the 5,200 large businesses analysed in KPMG's sustainability reporting study reported on CSR, with numbers exceeding 90% in most high-income nations (KPMG IMPACT, 2020). While initially voluntary, at least 64 countries have mandatory sustainability reporting requirements at some level, including most major economies (Havrysh, 2020). Nonetheless, existing requirements apply primarily to large businesses and allow significant flexibility that can provide openings for low-quality reporting (Ibid.). Divergent practices across industries and geographic regions

remain problematic with differences in legal requirements and best practices (Dienes et al., 2016; Hahn & Kühnen, 2013). In the shipping industry, sustainability disclosure remains limited, and the quality of CSR reporting is generally low (Karagiannis et al., 2022; Michelon et al., 2015).

In the last 25 years, initiatives like the Global Reporting Initiative (GRI), Sustainability Accounting Standards Board (SASB), and ISO 26000 standards increasingly enhanced the non-financial reporting practice. Today, GRI is the most common reporting standard, used by 78% of the top 250 global companies (KPMG, 2022). This makes the GRI a “*de facto sustainability reporting guideline recognised internationally*” (KPMG, 2014, p. 3), improving the quality of non-financial sustainability reporting. GRI metrics offer easier measurability due to their focus on the materiality principle (Adams et al., 2021). To encourage sustainability, they “*prioritize reporting on those topics that reflect [an organization’s] most significant impacts on the economy, environment, and people, including impacts on human rights*” (GRI, 2020a, p. 8). This inclusion of all aspects in current reporting standards points to the growing importance of comprehensive frameworks for reporting and measuring sustainability. With the UN adopting such a comprehensive framework as Sustainable Development Goals, reporting standards like the GRI can help operationalise corporate action towards larger sustainability goals (Ordonez-Ponce & Khare, 2021). The GRI supports this integration by publishing guidelines for explicitly integrating SDGs into existing reporting (GRI, 2020b). Establishing this link between existing reporting practices and the UN initiative is a challenging but crucial step to successful SDG adoption (Bebbington & Unerman, 2018; Kücükgül et al., 2022).

An important Multi-Stakeholder initiative (MSI) working towards that connection is the United Nations Global Compact (UNGC). It partners with businesses from all industries to encourage greater contributions to sustainability. Founded in 2000, it is “*the world’s largest corporate sustainability initiative*” (UNGC, 2021). Since 2015, its strategy has been focused on achieving the Agenda 2030 and Paris Accords. (Ibid.) The effectiveness of the compact is hotly debated, especially given the evident gaps between the promises made by member companies and their performance. (Voegtlin & Pless, 2014). Nevertheless, recent research has demonstrated the moderate positive impact of UNGC membership on CSR performance and improved financial outcomes. (Ortas et al., 2015; Schembera, 2018) Notably, the UNGC cooperates with the GRI and the World Business Council for Sustainable Development (WBCSD) to guide companies

on “*how they can align their strategies as well as measure and manage their contribution to the SDGs.*” (GRI et al., 2015).

2.3 Sustainable Development Goals and the Shipping Industry

Adapting to the SDGs is a highly relevant challenge for the shipping industry. Passed in 2015, the Sustainable Development Goals (SDG) offer an agenda for sustainability action along three dimensions: the economic, social, and environmental. These dimensions correspond to the triple bottom line that forms the core of sustainable shipping practice (Zhou et al., 2023). It is the United Nations’ most ambitious framework for sustainability yet, and its 17 goals contain 169 targets and 232 indicators intended to make progress towards the goals measurable (Fleming et al., 2017; Transforming Our World, 2015). Rather than a legal compact, the goals provide a call to action and guidelines for member states’ implementation with a broad view of stakeholders, including governments, corporations, and civil society actors. Businesses play a crucial role in achieving the goals (Rosati & Faria, 2019b). While the UN’s global Agenda does not explicitly mention the shipping industry, its considerable impact on economic, environmental and social challenges to sustainability makes it a key factor in achieving the goals (UNCTAD, 2019).

The Agenda 2030 has increased attention to questions of sustainability in the maritime industry (Di Vaio et al., 2021). The United Nations International Maritime Organization (IMO) sets sustainability targets in alignment with SDGs and guides their applicability to the maritime industry. As a UN body, the IMO is formally committed to the SDGs in the Agenda 2030 and developed the Strategic Directions in 2017 that provide guidance specifically for the maritime sector (Christodoulou & Echebarria Fernández, 2021) and specify the relevance of each target for shipping. Concerning the shipping industry, the IMO defines Goal 14, “Life Below Water”, while detailing how the shipping industry can contribute to all goals (IMO, 2019).

Table 1: Role of the maritime industry in achieving UN's Sustainable Development Goals

SDG		Role of the maritime industry in achieving SDGs
1	No Poverty	Ensure global transportation and facilitate trade - creating prosperity and sustainable growth in a green economy
2	Zero Hunger	Ensure efficient and economical supply chains for global food distribution; safeguard a significant source of nutrition by tackling illegal and unregulated fishing
3	Good Health and Well-being	Contribute to human health and the environment by reducing shipping-related pollution in oceans, ports and coastal regions
4	Quality Education	Safety and security at sea, marine environmental protection and efficient global trade depend on seafarer competence gained through education and training
5	Gender Quality	Support gender equality, empower women and promote female career development in the maritime sector through global programmes and activities
6	Clean Water and Sanitation	Minimise waste disposal and dumping at sea, which is a crucial component of the overall waste-management cycle
7	Affordable and Clean Energy	Promote funding, research and development of clean energy technology and energy infrastructure for the maritime sector
8	Decent Work and Economic Growth	Seafaring is an important source of work, especially in developing countries. Issues surrounding seafarers' health, working conditions, social security, and welfare are central themes in the shipping industry
9	Industry, Innovation and Infrastructure	Advance more efficient shipping, working in partnerships, will be a major driver towards global stability and sustainable development for the good of all people
10	Reduced Inequalities	Enhance capabilities and capacities in countries which lack the technical knowledge and resources to operate a safe and efficient shipping industry
11	Sustainable Cities and Communities	Sustainable cities and communities rely on a secure supply chain. The shipping industry helps with risk management and maritime safety and security standards to protect the global maritime logistics infrastructure
12	Responsible Consumption and Production	Reduce waste generation, operational waste from ships, and dumping waste at sea. Promote recycling, clean production and sustainable consumption
13	Climate Action	Control emissions from the shipping sector and foster solutions to minimise shipping's contribution to air pollution and its impact on climate change
14	Life below Water	Prevent marine pollution from ships and land-based sources and adopt measures to protect the marine and coastal ecosystems
15	Life on Land	Prevent biodiversity by curtailing the global spread of invasive species by ships and halt illegal wildlife poaching and trafficking
16	Peace, Justice and Strong Institutions	The shipping industry promotes effective institutions to ensure the safe, secure and environmentally protective flow of maritime commerce
17	Partnerships for the Goals	IMO currently has partnership arrangements with >60 IGOs and > 70 NGOs, including major global environmental organisations and bodies

Source: adapted from IMO and the Sustainable Development Goals (<https://www.imo.org/en/MediaCentre/Hot-Topics/Pages/SustainableDevelopmentGoals.aspx>)

IMO also provides more concrete support by linking its technical assistance work to associated SDGs (IMO, 2017). While the goals are broad and some lack measurability, they can lead to increase sustainability disclosure if backed up by regional or national binding rules (Dang & Serajuddin, 2020; Pizzi et al., 2021; Rosati & Faria, 2019a).

2.4 Regulatory Frameworks

Maritime legislation is important in reforming industry practices and incentivizing more sustainable shipping models (Lai et al., 2011). Because of the global nature of the shipping industry, transnational regulatory bodies play an essential legislative role and help set and implement standards. The United Nations' International Maritime Organization (IMO) is tasked with ensuring the "safety, security and environmental performance of international shipping" (IMO, n.d.). It creates conventions and protocols that set minimum standards for member states or regional-level regulations. Two of the important conventions developed and maintained by the IMO form the basis for sustainability standards in the maritime industry. Firstly, the International Convention for the Safety of Life at Sea (SOLAS). SOLAS sets out minimum safety standards for ship construction, equipment, and operation, aiming to ensure the safety of passengers and crew members on board ships. Secondly, the International Convention for the Prevention of Pollution from Ships (MARPOL). MARPOL sets standards and regulations to prevent pollution from various sources, including oil spills, harmful substances carried by ships, sewage discharges, and air emissions (IMO, 2013).

Both conventions have been repeatedly amended and offer a binding regulatory framework for all signatory states. Relevant conventions of other international organisations include the International Labour Organization's Maritime Labor Convention (MLC), regulating workers' rights in the shipping industry. While the IMO sets global standards, it relies on member states to translate its initiatives into national policy and legislation (Garcia et al., 2021; Sciberras & Silva, 2018). In pursuit of the goals, the IMO adopted new strategies that expanded the focus from preventing water pollution to overall environmental impact. Its updated greenhouse gas (GHG) emissions regulation and IMO 2020 strategy limiting sulphur in ship fuel oil exemplify a broader approach to making shipping more sustainable (Joung et al., 2020; Sáez Álvarez, 2021). However, the IMO is frequently criticized for its actions' small scale and low ambitions and is limited by a reliance on member states for its mandate and implementation (Chircop & Shan, 2020; Halff et al., 2019).

Other regulatory bodies like the European Union follow IMO standards but often surpass the scope of its conventions of the IMO's limited authority. Its GHG reduction targets provide the framework for the EU's new *Fuel EU Maritime* emissions regulations (European Commission, n.d.). Moreover, while the EU's monitoring, reporting and verification regulation (EU-MRV)

tracking CO₂ emissions in the shipping industry coexists with the IMO's data collection system, its scope is more ambitious (Adamowicz, 2022). The EU is also advancing market-based forms of sustainability regulation. Starting in 2024, the EU will include the shipping industry in its Emissions Trading System (ETS). This scheme will introduce a cap on the carbon emissions per company, requiring any additional consumption to be offset by purchasing certificates (Lagouvardou et al., 2020).

2.5 Prior Research on Sustainability Disclosures and SDG Adoption

While the comprehensive nature of SDGs has led to increased research into corporate adoption, much of this research has focused on larger multinational corporations, publicly traded entities or sectors with an unambiguous relationship with specific goals, such as energy, manufacturing or agriculture. The maritime and shipping industry has received comparatively less attention. Before adopting the 2030 Agenda for Sustainable Development in 2015, scholars identified a patent lack of concern for sustainability in shipping company disclosures. Fafaliou et al. demonstrated that Greek shipping companies in the mid-2000 were only likely to include CSR categories by virtue of individual owner awareness or as part of existing conglomerate CSR strategies in the case of subsidiaries (Fafaliou et al., 2006). Deengar confirms the lack of implementation of the vague sustainability goals and highlights the potential of unified standards in reporting to create additional forms of accountability outside of limited regulatory compliance (Deengar, 2007). Amidst uneven adoption of CSR standards in the mid-2010s (Drobetz et al., 2014), a comprehensive industry report on CSR in the International Shipping Sector in 2013 highlighted the industry-wide desire for common CSR metrics and standards and increased collaboration and guidance for both customers and investors (Coady et al., 2013).

Private MSIs like the UNGC – forums for collaboration between NGOs and corporate actors – demonstrate this need for collaboration on CSR implementation (Yliskylä-Peuralahti & Gritsenko, 2014). Within an inconsistent regulatory environment, MSIs have thrived in the shipping industry. Prominent shipping MSIs include the Clean Cargo Working Group, the World Ports Climate Initiative, Green Marine, and Green Ship of the Future (Coady et al., 2013). While MSIs spurred the development of CSR industry guidelines, there has frequently been criticism of poor integration into IMO conventions and its contribution to regulatory fragmentation through confusing and non-complementary rating options (Lister, 2015). Despite these challenges, the prevalence of MSI in the shipping industry points to the growth of CSR

reporting in the sector. It stresses opportunities for comprehensive frameworks in addressing adverse circumstances for limited, voluntary standards (Wuisan et al., 2012).

Expanding earlier focuses on narrow social and environmental metrics in CSR reporting (see Vejvar et al., 2020), recent papers have assessed the implementation status of broader sustainability metrics associated with SDGs in the maritime industry. SDGs can provide such a comprehensive framework, albeit with significant caveats. (Stevens & Kanie, 2016) Based on disclosures in company reports, Zhou et al. (2021) identify inconsistent categorisations of sustainability, which “can be ambiguous for stakeholders”, and propose three latent categories that broadly correlate with SDGs: employee training and management, sustainable business management, and sustainable shipping operation. Wang et al. (2020) seek to redress this ambiguity by associating existing sustainability metrics with SDGs and proposing a comprehensive framework that sorts SDGs from core to extended responsibilities based on their extensiveness and motives. While Zhou et al. (2021) findings of stakeholder priorities diverge from company incentives, SDGs 8 and 14 arise as core responsibilities in both studies.

These findings of limited and uneven adoption build on studies of the drivers of adopting sustainability metrics. Stakeholder interest theory has emerged as an important theoretical framework. Scholars argue that demands by diverse stakeholders, including customers, suppliers, and NGOs, are vital in driving sustainable shipping practices (Parviainen et al., 2018; Tran et al., 2020). They are particularly important for facilitating sustainability measures without apparent long-term benefits (Fasoulis & Kurt, 2019; Tang & Gekara, 2020). However, in a survey of maritime transport companies in Singapore, Yuen et al. (2020) assert that this stakeholder influence is mediated mainly through structured sustainability integration. This highlights the role of frameworks like the SDGs in channelling stakeholder influence. In the shipping sector and beyond, however, significant scepticism remains about whether increased engagement with SDGs drives real change or remains superficial (Diaz-Sarachaga, 2021; Heras-Saizarbitoria et al., 2022). Thus identifying the degree to which companies engage with SDGs remains crucial in assessing their relevance, particularly in the shipping sector, facing challenges in multiple dimensions of the goals.

3 Methodology

This section describes the research methodology used in this dissertation. It presents the research approach, methods, and sources used. It also introduces the system for classifying measurable targets and an SDG-engagement scoring system used in the analysis.

To address the research questions, we performed an exploratory empirical study. The methods applied comprise a literature review, a qualitative content analysis of sustainability reports published by organisations that claim to be committed to the SDGs, and a series of semi-structured interviews with representatives of corporate, regulatory and non-governmental actors in the shipping sector. The multidisciplinary approach is deemed adequate to reach the aim of the thesis.

3.1 Sampling

To determine a suitable data sample for the study, this paper used the global Top 100 ranking of container/liner operators provided by the renowned industry consultancy Alphaliner (Alphaliner, 2023). Where provided, It researched the corporate websites and sustainability reports of the top 30 companies in this database to reference SDG-related information.

Most (n=16) companies did not mention SDGs in their corporate disclosures, neither on their websites nor in their sustainability reports, where available. 47% (n=14) of the shipping companies published references to the SDG, whereby 3% (n=1) of them were on their website and 23% (n=7) in their annual sustainability reports only. 20% (n=6) of the carriers have addressed the SDGs on their website and in their report; almost all belong to the top 10 companies. Seventeen companies (57%) published a sustainability report, of which 14 referenced SDGs. All the top 12 of the market reported on their SDG orientation, except for the Chinese company COSCO Shipping Corp. (no. 4). Having explicitly articulated their SDG orientation until the reporting year 2019, COSCO eliminated this from 2020 onwards.

Finally, we identified 13 of the 30 largest container shipping companies for inclusion in our data sample: MSC Mediterranean Shipping Company (from now on referred to as MSC), A.P. Moller-Maersk (Maersk), CMA CGM Group (CMA CGM), Hapag Lloyd, Evergreen Marine (Evergreen), One Ocean Network (ONE), Hyundai Merchant Marine (HMM), Yang Ming Marine (Yang Ming), ZIM Integrated Shipping Services (ZIM), Wan Hai Lines (Wan Hai), Pacific

International Lines (PIL), Matson Navigation Company (Matson), and Swire Shipping (Swire). A brief description of the selected companies is presented in Table 2.

Table 2: Data sample – selected container shipping companies

Global rank	Company name	Country HQ	Load capacity TEU ('000)	Market share (%)	Managed Ships (#)	Head-count ('000)
1	MSC	Switzerland	4,502	17.4	698	83.1
2	Maersk	Denmark	4,264	16.5	725	85.4
3	CMA CGM	France	3,335	12.9	588	85.6
5	Hapag Lloyd	Germany	1,761	6.8	249	14.1
6	Evergreen	Taiwan	1,606	6.2	204	10.6
7	ONE	Singapore	1,507	5.8	201	7.7
8	HMM	South Korea	818	3.2	76	4.0
9	Yang Ming	Taiwan	708	2.7	95	1.8
10	ZIM	Israel	516	2.0	139	4.5
11	Wan Hai	Taiwan	427	1.7	152	3.9
12	PIL	Singapore	297	1.1	91	18.0
27	Matson	USA	69	0.3	29	4.5
29	Swire	Singapore	64	0.2	32	1.8

Source: Alphaliner Top 100 container/liner operators (as of 4 Oct 2022); company disclosures

These 13 companies account for around 77% of the shipping transport capacity in this industry sector. All companies reported revenues above USD 1 bn for 2021, except for Swire (USD 0.3 bn). Thus, the focus in this study will primarily be on large companies, which is in coherence with KPMG's survey findings that (1) the larger companies are the drivers in sustainability reporting and (2) the likelihood of getting sustainability information decreases related to the size of the company (KPMG, 2013).

3.2 Content Analysis

The analysis focuses on qualitative aspects, as evaluating sustainability disclosures in the industry inherently involves qualitative data. It offers direct insights into different forms of SDG engagement and allows for flexibility in exploring the underlying reasons. This thesis uses content analysis as the primary research method. Content analysis is a systematic and objective approach for condensing a large amount of text and words into predefined content categories based on coding rules (Schreier, 2012). Measuring the frequency of categories and themes

allows for deriving a proxy for significance (Vaismoradi et al., 2013). This thesis examines the content of shipping companies' publicly available sustainability disclosures accessed through corporate websites. Within academic sustainability studies, reviewing sustainability reporting is well-established but requires tailoring to the research area (see Calabrese et al., 2021; Dienes et al., 2016). This form of analysis represents the most appropriate approach for addressing the first research question of SDG engagement, as it enables a classification of SDG reporting by business.

This study analyses and combines different indicators, covering multiple aspects of SDG engagement. It investigates how frequently goals are mentioned, what relevance within the report (words, chapters) is dedicated to them, and how concretely they are addressed (intentions, action taken, progress vs targets). In addition, it identifies all measurable targets and key performance indicators (KPIs) enclosed in the sustainability reports. It divides them into four categories: 1) targets tied explicitly by the businesses to an SDG in the disclosure. 2) indirectly associated targets featured in a pictogram or matched to an SDG through their position in a chapter. 3) targets without reference to a goal that can be meaningfully matched with specific SDG using the GRI's instruction (GRI, 2020b). This method may result in double counting in the case of ambiguity or wide-reaching commitments that cover multiple goals. 4) Targets with no relationship to the SDGs. These were excluded from the analysis.

3.3 Scoring

Based on the content analysis, the paper summarizes the overall level of a company's SDG engagement along six indicators: (1) the organization's expressions of SDG commitment, (2) the relevance of SDGs in the report, (3) stated intentions for supporting specific SDGs, (4) actions taken on SDGs, (5) the presence of measurable targets, and (6) reporting of performance towards defined targets. Each indicator consists of two or three aspects derived from the content analysis (see Table 5 in Appendix II).

To determine the level of engagement, we developed a scoring system. It attempts to rate qualitative and quantitative information using a 4-point quantitative measurement scale for SDG engagement. The scores reflect the extent and quality of provided information of each indicator. Under this scoring system, zero points were given for no relevant information, 1 point was assigned for generic statements with limited clear data/information, 2 points for specific clear

and moderate levels of information, and the maximum score (3 points) for extensive relevant disclosures. The scoring system attempts to cover relevant aspects of SDG engagement and complements the content analysis findings. It will provide a detailed comparison of the SDG contribution in the maritime sector and reveals areas of shortcomings.

3.4 Interviews

Given the limited information accessible through publicly available reports to address RQ 2, the paper also uses interviews with key industry actors. Interviews are an effective tool for understanding SDG adoption from a company perspective (Galletta & Cross, 2013; Ike et al., 2019). Six interview participants represent shipping companies (3 interviews), industry associations (1 interview), maritime NGOs (1 interview), and policymakers (1 interview). The interviewed organisations are anonymous in this study to protect the privacy and are named SC1, SC2, SC1, IA, NGO, and PM onwards. All six interviewees are experienced practitioners (managers and above) with relevant subject knowledge, leading to a small sample size (Carmichael & Cunningham, 2017). The list of interviews is included in Appendix III.

Semi-structured interviews were chosen for data collection because they are a well-suited method for obtaining perceptions from respondents on complex issues and enable probing for more information or clarification where necessary (Barriball & While, 1994). Semi-structured interviews are characterised by some degree of predetermined questions and flexibility regarding time and order while also allowing follow-up questions that can deepen and broaden the interviewer's understanding and would not be possible in a structured interview (Denscombe, 2010). This dissertation uses semi-structured interviews to identify barriers and drivers related to the actual SDG engagement of organisations and to complement and validate the results from the content analysis of sustainability disclosures. Such a triangulation of primary data with secondary data sources allows for enhanced reliability and validity of the research (Sekaran & Bougie, 2016; Yin, 2018).

For the interviews, two different interview guides were constructed depending on which type of actor was interviewed. The guide was built around six questions with sub-questions prepared to probe for more detail. Interviews were conducted virtually using videoconferencing software due to the geographic dispersal of the interviewees. Each interview was recorded and transcribed, and coding was deployed to analyze the data and derive meaningful insights.

4 Findings

This chapter provides the findings of the analysis. The first section focuses on the level of engagement with the SDGs. Its first subsection presents the adoption of SDGs in sustainability disclosures. Subsequent subsections (4.1.2-4.1.4) identify which SDGs are prioritized and whether measurable sustainability targets back up engagement before assessing the industry's overall engagement towards Agenda 2020. Second, it presents barriers and levers for increased SDG engagement (4.2).

4.1 Engagement with Sustainable Development Goals

All shipping companies in the sample communicate their engagement with the SDGs through sustainability disclosures. However, the extent, quality of reporting and level of commitment vary widely. The content analysis outlines the larger numbers of adopted SDGs compared to the relatively low prioritisation and number of measurable targets they receive in the reports.

4.1.1 Adoption in the Shipping Industry

Among the 13 selected companies in the sample, the adoption of SDGs is not universal. Only two companies (MSC and CMA CGM) included all 17 goals in their sustainability reporting. The other organizations in the sample (n=11) mentioned between four and thirteen goals.

A frequency analysis reveals a 100% adoption rate for the SDGs 8 (Decent Work and Economic Growth), 13 (Climate Action), and 14 (Life below Water), followed by the two SDGs 4 (Quality Education) and 17 (Partnerships for the Goals) with an adoption of 92%. Also, a strong preference can be determined for the following SDGs (in descending order with adoption rate): 5 (Gender equality), 12 (Responsible Production and Consumption), 16 (Peace, Justice and Strong Institutions), 7 (Affordable and Clean Energy), and 3 (Good Health and Well-Being). On the contrary, SDGs 1 (No Poverty), 2 (Zero Hunger), 6 (Clean Water and Sanitation), and 15 (Life on Land) are mentioned by less than 1/3 of companies. The remaining SDGs reassemble between the indicated ranges above, with overall frequency varying between 38% and 54%.

Accordingly, SDG adoption by goal can be categorised into four clusters. The first cluster (high adoption) consists of five SDGs mentioned by more than 90% (n≥12) of sampled companies: 4, 8, 13, 14, and 17. The second cluster (medium-high adoption) contains four goals adopted by 77-85% of companies (n=11): 5, 7, 12, and 16. Cluster three (medium-low adoption), with

an adoption rate between 54% and 69%, spans goals 3 and 9. The six remaining goals determine cluster four (low adoption) with an adoption below 50% of companies ($n \leq 7$).

Table 3: SDGs addressed in companies' sustainability disclosure

Company n=13	Σ SDGs	SDGs																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
MSC	17/13*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Maersk	13/0			+	+	+		+	+	+	+	+	+	+	+	+	+	+
CMA CGM	17/8*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Hapag L.	6/6*				+				+					+	+		+	+
Evergreen ¹⁾	10/4*			+	+	+		+	+			+	+	+		+	+	+
ONE	10/4*				+	+		+	+	+		+	+	+		+	+	+
HMM	14/0		+	+	+	+		+	+	+	+	+	+	+	+	+	+	+
Yang Ming	10/0			+	+	+		+	+				+	+	+		+	+
ZIM	10/10				+	+		+	+	+	+		+	+	+		+	+
Wan Hai	17/0	+		+	+	+	+	+	+			+	+	+				+
PIL	8/0				+			+	+	+				+	+	+		
Matson	11/0		+	+	+	+			+		+	+	+	+	+		+	
Swire	10/10			+		+		+	+	+			+	+	+		+	+
Σ	147/35*	3	4	9	12	11	3	10	13	7	6	5	11	13	13	4	11	12

Note: ¹⁾ SR report contains prioritised SDGs only. Evergreen published the remaining SDGs on their corporate website; * = prioritised SDGs

Source: Companies' sustainability disclosures for the financial year 2021

This clustering shows the highest prevalence for SDGs, with targets directly actionable for companies. Environmental goals in the high adoption cluster directly impact shipping companies' operations through factors such as waste and emissions reduction. At the same time, this does not mean that all SDGs with highly actionable targets are adopted more often. Goal 9 (Industry, Innovation and Infrastructure) explicitly relates to transportation and is highly relevant to the shipping sector. Its targets include upgrading and retrofitting infrastructure to be less resource-intensive, adopting efficient processes and encouraging investment in research and development. Nevertheless, it features in the bottom half of adopted goals in only 54% ($n=7$) of analysed reports and below significantly less actionable goals relating to institution building (e.g. SDG 16).

4.1.2 Prioritisation of Goals

To further assess organizations' SDG coverage, this paper distinguishes between the superficially mentioned goals in reports and those described in greater detail. Firstly, some companies actively selected and justified prioritised targets: MSC mentions all 17 goals in their report while explicitly focusing on the impact of the thirteen most relevant ones. By contrast, PIL mentions eight targets and does not specify which ones are most relevant to the company or how they translate into concrete action. Looking at the individual SDGs, two sample ocean conservation measures related to goal 14 demonstrate the difference between concrete (a) and superficial (b) commitment: a) *Promoting a circular economy within our operations (waste, recycling), for our equipments [sic] (eco-design, end-of-life) and with our partners (channels)* (CMA CGM, 2021). b) *to act to achieve healthy and productive oceans* (Maersk, 2021).

Only 38% (n=5) of all businesses prioritised any SDGs. Among those five companies, the two actors with the highest prioritisation are conglomerates with business activities outside shipping (MSC, CMA CGM) whose non-financial reporting covers a broader range of business activities. Notable in this analysis is that all companies with explicitly prioritised goals have over 5% of the global market share. All smaller companies in this sample (between 0.3 and 2.7% market share) demonstrate engagement with the SDGs but do not put focus on a single of them. In addition to this gap, only two companies (Hapag Lloyd, ZIM) stated that they performed an analysis of their potential contribution or impact towards specific SDGs.

Organisations prioritised targets SDG 13 (climate action), SDG 14 (life below water), and SDG 8 (decent work and economic growth) most frequently. However, frequently adopted goals with more limited relevance to the shipping sector were rarely prioritized. 85% (n=11) of companies in the sample mentioned goal 5 (Gender Equality), mostly in relation to gender imbalance in the sector's workforce. But only 15% (n=2) offered a concrete description of their focus on this goal. A similar discrepancy exists for goal 12 (Responsible Consumption and Production), with 92% (n=12) of companies mentioning and only 15% prioritising (n=2). Both goals share that they affect the maritime industry but that its actors have the little aptitude to address them concretely.

4.1.3 Measurable Sustainability Targets

The analysis of adoption and prioritization shows that companies feature a broad range of goals in company disclosures with a high emphasis on core areas of industry concerns (SDGs 8, 13,

14). In a complementary analysis, we look at companies' concrete, quantified objectives and test whether they align with the goals and targets in the Agenda 2030. All but one sampled sustainability reports contain measurable (quantified) targets. However, goals vary widely between those explicitly tied by the organisations to specific SDGs in their disclosures, implicit ties and targets that incidentally match SDG targets by applying GRI's codes and alignment guidelines. Distinguishing explicit commitments from incidental alignment separates company goals directly related to Agenda 2030 from more generic sustainability goals.

Out of 151 total measurable targets featured by the companies, only 11 link explicitly to an SDG, 10 of which relate to the central goals 8, 12, and 13. Most targets (n=122; 81%) are only implicitly linked, like through an associated informational graphic. A further 28 targets establish no direct connection to the SDGs and can only be linked using GRI alignment guidelines. Ten targets did not be matched with any SDG. Analogous to adoption and prioritisation, most quantified targets focused on goal 13 (Climate Action), with 92% (n=12) of companies stating at least one measurable target for that goal. Goal 13 accounts for a share of 15% (n=22) of all measurable targets. Predominantly the stated targets address emissions reduction, as requested by IMO regulation. Three goals fail to register measurable commitments (SDGs 1, 2, 11). Another three are addressed in three or fewer targets across the entire sample, none explicitly linked to an SDG. Most remarkable among the low adoption of SDG-aligned targets is goal 14 (Life Below Water). As presented above, it belongs to the most adopted goals (alongside 8, 12, and 13). However, less than half of the sampled companies (n=6) disclosed a target related to goal 14, with no explicit attribution, and over half (n=5) generic GRI targets matched to an SDG in the analysis.

The data also shows highly selective commitments for most companies. Only four companies stated more than ten goals. A further two companies commit to aspects of six or seven goals, respectively, while the remaining seven companies commit to less than five. On average, the organizations only disclose 3.7 targets that can be matched to any SDGs. This means that while few companies report many different goals, the average number of companies committed to any single goal is only 3.8. This low attainment is compounded further by the low relevance of many goals. Besides wide-reaching emissions reduction targets towards goal 13, some attributable targets are of lower impact. For example, Wan Hai commits to goal 7 through a target of reducing the per-capita water consumption in the offices by 5% by 2030. Similarly, HMM

commits to a goal 4 related target through a yearly 3% training budget increase for training their onshore employees.

The latter target highlights that divergent timelines make these commitments challenging to compare. Timeframes can vary from year-over-year to cumulative targets until 2050. Additionally, some KPI-related targets, such as emission reduction, are counted twice because they can appear as separate data points depending on the timeframe. Given the generous counting method, the resulting coverage of goals by measurable targets is deficient. Out of 17 goals, each of the 13 companies, on average, only covers a third (33%) of all goals with any measurable target. Only three accounts for all instances of explicit SDG-related target reporting, making it a marginal practice in the sample.

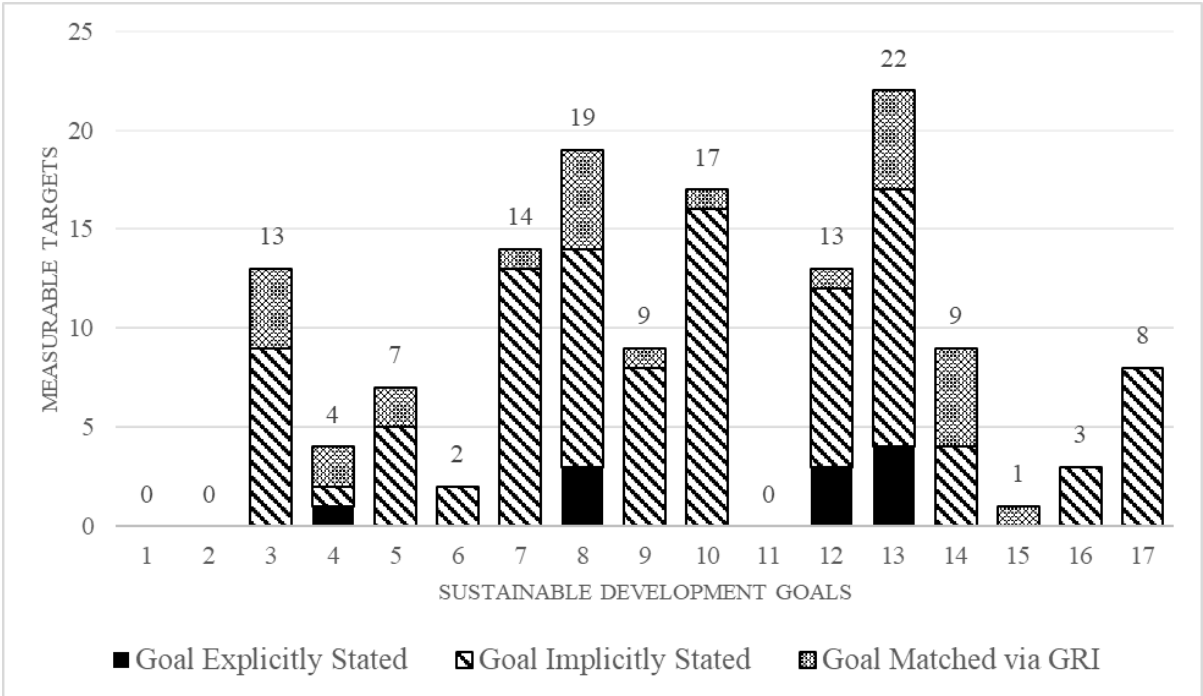


Figure 1: Measurable targets related to the SDGs

4.1.4 Industry Engagement

To provide an overall indication of areas where SDG engagement is already strong and where there is room for improvement, the analysis assessed six indicators to score relevant aspects of SDG engagement (Table 4). The ambiguous position of SDGs in the sector is captured in the difference between the overall level of SDG relevance and the mention of concrete SDG actions and targets. All large companies have adopted goals in some form, but relevance based on word

count and dedicated chapters already shows a more marginal position. None scores high, with all companies offering few words, no dedicated chapter, or little distinction from other sustainability measures.

Engagement for more concrete commitments and actions gradually shows lower average scores. In the category of concrete actions taken, some companies still perform higher. However, the even spread between extensive or moderate, generic, and no statements clearly reflects a diversity of approaches across the industry. This verbal commitment does not translate well into concrete measures. Only two companies scored higher than “1” on the number and goal coverage of targets. The lowest score overall, however, is for *Performance towards targets*, demonstrating a lack of commitment to report progress on defined sustainability targets.

Table 4: SDG engagement measurement

# of companies (n=13) Score	Level of SDG commitment	SDG relevance in report	Intensions for supporting specific SDGs	Actions taken on SDG	KPIs/ measurable targets defined	Performance towards targets
3	4	0	2	0	1	1
2	4	7	6	4	1	1
1	5	6	1	6	10	4
0	0	0	4	3	1	7
Score Ø	1,9	1,5	1,5	1,1	1,2	0,7

To better understand these levels of engagement with the UN’s Sustainable Development Goals, this paper uses the testimony of senior practitioners at three shipping companies (SC 1-3), an industry association (IA), a maritime NGO (NGO), and a policymaker (PM). It determines five relevant characteristics of industry commitment aligning with the disclosure analysis: Firstly, there is a high awareness of SDGs in the industry, with a primary focus on action towards goal 13 (Climate Action). Secondly, the direct impact of SDGs on company strategy and efforts is low, and most actors use SDGs as an additional sustainability guideline. Lastly, the pace of adoption remains slow, and there is considerable scepticism about achieving the goals of the global Agenda by 2030.

The previous analysis in Section 4.1 shows that all large companies in our sample consider SDGs in their sustainable strategy. Interview participants signal that awareness of the goals is high, presenting SDGs as an “*imperative for us to transition*” (SC3). SDGs are either

“integrated” into the sustainable development strategy (SC2) or *“aligned”* with existing sustainability targets (IA). In this environment, the NGO sees a *“growing understanding [among companies] that you need to work with them”*. All participants mentioned goals 13 (Climate Action) and 14 (Life Below Water) as the most important for their work. This includes regulatory and non-profit actors *“working actively on the sustainability agenda [regarding] greenhouse gases”* (NGO) and stating that the *“main objective is climate action, [...] goal no. 13”* (PM). SDGs *“carry a lot of weight”* (IA), and participants described them as a necessary component of any sustainability strategy. This matches the highest average scores of 2.8 and 2.5 levels of SDG commitment and relevance in reports in the engagement scoring.

Contrary to the general importance, respondents presented the direct impact of the goals on company strategy and actions as low. While SDGs impose an *“imperative [...] to transition”*, shipping company 1 does *“not use the framework as such to drive [their] efforts”*. Incompatibility with other frameworks was a central concern, as most ESG strategies *“are organised around internal KPIs and not derived from SDG targets”* (SC3). Fundamental objectives such as elimination of all discrimination (SD target 5.1) *“did not come out [of the] SDGs, it came out [the] materiality evaluation”* for shipping company 3. So while *“half of [all our] KPIs are directly related to the SDGs”* at a major shipping company (SC3), most of them are not primarily motivated by it. Accordingly, a high share of measurable sustainability targets is only indirectly or not at all tied to SDGs, as seen in 4.1.3. The SDGs were also perceived as secondary because some companies had *“already started [their] actions for the climate and society before the SDGs were introduced”*, only subsequently adding them to an existing strategy (SC2).

4.2 Barriers and Levers for Increased SDG Adoption

Based on the interview responses, this chapter identifies three key barriers and pairs them with the three most effective levers for more meaningful adoption of SDGs. The barriers are the IMO’s slow pace of regulatory implementation, adverse political and economic circumstances, and lack of capacity for implementation. The three most important levers to overcome them are increased regulation, incentive structures creating competitive advantages and higher stakeholder pressure.

4.2.1 Barriers

The main barrier limiting the adoption of SDGs by shipping companies is the lack of comprehensive regulation defining sustainability reporting. Targets are often not directly useable for companies, which require “*more concrete objectives*” (SC2) and “*better guidance*” (SC3) on how to achieve the goals. Both regulatory and industry respondents expressed frustration that the IMO is only slowly translating Agenda 2030 into concrete regulation. To make these targets more concretely actionable, shipping company 1 is “*pushing the IMO very hard to become more progressive*” together with other industry partners. The IMO’s slow pace encourages regional regulators to exceed its standards and set a “*legislative template, hoping the organisation will follow*” suit (PM). An example of such delayed action at the UN level is the IMO’s data collection system (DCS) resolution, which passed in 2016, over a year after the EU had implemented a similar regulation on monitoring, reporting and verification (MRV) of emissions.

The second main barrier is the precedent of profitability in company operations. The fact that sustainability goals are subordinate to financial concerns leads to “agreements [that] are often pragmatic” (SC2) and fall short of the goals. From the perspective of shipping companies, this “situation hinders progress on the SDGs” because even ambitious actors fall back to minimal regulation to avoid competitive disadvantages. Industry and regulatory respondents agree that high necessary investments into sustainability are a main barrier (PM). Shipping companies prioritise business prosperity and requirements and lack clear incentives to subordinate sustainability goals (SC1, SC3, IA). Crises like the COVID-19 pandemic, the war in Ukraine and energy price fluctuations intensify this unfavourable environment. The “highly dynamic market situation” further negatively impacts the economic barriers to increased SDG adoption (IA).

Lastly, the sector is strongly divided by the technological and organisational capacity to implement the goals. While IMO interventions like limiting sulphur in fuel oil are expensive but technically feasible, often “*there are no clear solutions available yet*” (PM). Regulatory actors are increasingly aware that they also need to support technological development to help provide the means for achieving SDGs, particularly related to environmental advancements. This lack of capacity is most evident in smaller companies accounting for the bulk of the sector, and their ability to address SDGs is constrained by limited resources (NGO). Our analysis supports this divide. Even with the sample limited to companies in the top 30 globally, none of the included

companies with a market share under 5% actively prioritised goals in their reports, even if they mentioned them at a similar rate.

4.2.2 Levers

Interview participants identified levers that could advance sustainability and the adoption of SDGs in the shipping industry. The first major factor is coherent global regulation and defined standards. Increased guidance from the IMO “*would strengthen the goals*” (NGO) and level the playing field between regions. Organisations like the World Shipping Council offer one way for companies to advance these concerns (SC1). While decisive IMO action could significantly impact SDG adoption, EU regulation is already a main driver for companies to embrace sustainability targets. (SC3) Regional improvements in large markets can “*impact and drive [sustainability] even outside of Europe*” (NGO). As the EU explicitly aligns its regulatory initiatives with the IMO and SDG-related directives, regulatory pressure can positively influence SDG target adoption. For example, its regional climate law aims to “*reduce emissions [...] to achieve -55% emissions by 2030*” (PM) and aligns directly with the -45% from 2010 levels proposed in the strategic plan for SDG 13. Even if regional regulation does not directly impact the sector globally, it can give companies a long-term “competitive advantage” by achieving goals before they are even adopted at the level of the IMO (PM).

In this aspect, regulatory pressure overlaps with the second main lever. Shipping companies and the industry association emphasised the importance of providing incentives that offer a competitive advantage. Generating a competitive advantage would provide a reason for companies to adopt sustainability goals, even while profitability remains the priority (SC1, 4). This is a reliable strategy from the industry association standpoint, as previous successful implementations result from this advantage (IA). From the regulatory perspective, this incentive structure could be a “*carrot*” complementing the mandatory “*stick*” (PM). Because one of the previously discussed barriers is cost, offering a financial translation for goal achievements would provide an additional rationale for goal adoption (SC2). Besides financial incentives, the importance of the SDGs can also act as social incentives. Focusing on a transition towards sustainability can help companies “attract and retain talent” by demonstrating a commitment to a “progressive cause”.

The third main lever of increased pressure from key industry stakeholders supports the prominence of stakeholder theory in prior research. Like regional regulation, the expectations and pressure from these stakeholders are often “*ahead of the SDGs*” (SC3). This means that other parts of the supply chain where SDG-related sustainability measures are already more present positively influence the adoption in the shipping industry (NGO). Increased customer pressure forces companies to demonstrate commitment to the SDGs, and sustainability thereby becomes a tangible factor impacting profitability. Increased stakeholder pressure is especially influential because multiple parties like charterers, financing companies, customers, and end-consumers can drive engagement with sustainability together (NGO). Besides regulatory compliance, existing stakeholder pressure is already the “main driver of SDG adoption” (SC1, 2). Leveraging this pressure can thus spur SDG adoption beyond the current level.

5 Discussion

This chapter discusses the main findings and relates them to the results of prior research. The first section (5.1) reflects on the overall state of SDG engagement in the shipping industry, whereby the second section (5.2) suggests strategies for strengthening SDG engagement.

5.1 Assessing the State of SDG Engagement

Combining an analysis of sustainability disclosure with industry interviews answers both research questions in this paper. The first question about industry engagement leads to an austere assessment of the state of SDG engagement. The sector-wide level of the shipping industry's engagement with the goals is low. At the time of Agenda 2030's adoption, large companies were more likely to be early adopters (Rosati & Faria, 2019a), and this gap was still present in 2021. While the adoption of SDGs in sustainability disclosures is now widespread, it is limited to a few large companies and centres around a few key goals. These are mostly limited to areas directly relevant to the industry, and the adoption deviates from previously theorized distinctions between core and extended responsibilities (Zhou et al., 2021).

Wang et al. (2020) suggest that targets with a restricted scope and legal/economic basis (8,9,12,14) constitute the core responsibilities, with more extended and externally motivated SDGs falling under the categories of facilitation (2,7,13,16) or extended responsibilities (1,3,4,5,6,10,11,15). The sampled industry actors diverge from this ascribed order of relevance. For example, 92% of companies (n=12) adopt goal 4 (Quality Education) as an extended responsibility. Yet High adoption rates in areas like education often relate to existing professional development and training initiatives within companies' sustainability strategies. This suggests that using SDG-related language is often only mapped onto previously existing priorities. Conversely, the previously discussed goal 9 has a more limited scope. It falls under core responsibilities in the unified framework, yet factors such as financial concerns might impact its prevalence in reporting.

This impression of the SDGs as a subordinated concern in sustainability disclosures is supported by the low number of measurable targets reported. The overwhelming majority of reported targets are either only implicitly connected to an SDG or unlinked. Besides appearing in lower numbers, targets for material goals like 9 (Industry, Innovation and Infrastructure) and 14 (Life Below Water) are never explicitly linked to their respective SDG. Some goals with

higher relevance are adopted less because other factors like financial resources limit goals with high actionable targets. Especially for rarely featured targets relating to innovation and infrastructure, shipping companies might already have the technical or operational means to achieve goals with current technology, but other constraints limit them (Lai et al., 2011). The engagement of shipping companies with SDGs appears selective from these insights. Beyond direct relevance to a company's operation expressed in the materiality principle, limitations and the compatibility of existing initiatives with SDG-related targets must be considered.

Interview respondents confirm the impression that SDGs occupy a secondary role in creating sustainability strategies. Concrete sustainability commitments made by large shipping companies reveal a lack of genuine engagement as companies and stakeholders still see them as too generic for the operational level (Vildåsen, 2018). Overall, the level of commitment remains low, with a focus on environmental goals and much weaker engagement with the other aspects of the triple bottom line. This emphasis on environmental objectives matches the area of most new regulatory initiatives. Interviews confirm that adopting environmental goals follows this increasing pressure rather than preceding it. Within the small scale of commitments, very few companies explicitly link to the SDGs, with most either implicitly aligned or utilizing different frameworks altogether. Most concrete targets are unrelated to SDG goals, as other frameworks are more relevant to current sustainability strategies. While the goals and associated targets play an important role, their adoption is only rationalised instead of driven by the SDGs. Even with integrating the goals into the sustainability strategy, adopting SDGs is a helpful but incidental addition to existing frameworks.

This lack of coherent engagement contributes to insistency as reporting quality varies. (Tsalis et al., 2020) Sustainability disclosures lack standardised metrics to quantify and assess their quality easily. This is problematic for SDG adoption, as the integration of the framework is a key factor for successful implementation (Stafford-Smith et al. 2017). Sustainability disclosures can also overstate a company's engagement with the SDGs (Diouf & Boiral, 2017) seen in the prevalence of GRI metrics with no clear attribution for most goals. As demonstrated in the analysis of measurable targets, utilizing the GRI's recommendations to match targets to SDGs only partially addresses this issue. Without clear attribution to a goal, ambiguity and varying timelines make it harder to compare engagement reliably. Even with growing awareness, insufficiently concrete and ambitious reporting reduces signals of lower relevance for adopted goals (Mhlanga et al., 2018).

Moreover, there is a significant discrepancy in commitment levels between large and small shipping companies. This finding is supported by interviews conducted with industry experts and the observed lack of prioritization of the SDGs among companies with lower market share. While smaller businesses have emulated large ones in adopting goals, they fall short in concrete commitments as company size remains a limiting factor. (Kazemikhasragh et al., 2021). Smaller companies also lack the capacity and knowledge to engage with the SDGs meaningfully. Given the large number and importance for the sector, meaningful SDG engagement in the entire industry is even more limited than partial adoption by the most significant actors. The larger companies demonstrate that the awareness of the goals is generally high, but the SDGs do not drive concrete action towards sustainability. Agenda 2030 acts as a general indicator for the sector, but tighter regulation and stakeholder pressure play a more significant role in sustainable shipping.

5.2 Recommendations: Strengthening SDG Engagement

Understanding what measures are impactful for advancing sustainability addresses the second research question concerning barriers and levers. Complaints over slow regulatory pace as a barrier and the positive impact of existing regulation highlight its outstanding importance for achieving sustainability goals. Another recurring factor is the SDGs' abstract nature in the shipping industry context. Despite clarification by the IMO and harmonization with reporting standards, abstract goals allow companies to retroactively apply SDGs to existing strategies rather than following the goals. Based on the findings on barriers and levers, this paper suggests four measures at different levels that would strengthen SDG engagement in the shipping industry.

(1) Compulsory SDG-related reporting standards

Sustainability reporting is central to understanding businesses' contributions, but disclosures lack consistency and often do not present comprehensive information (Boiral et al., 2019). Compulsory reporting standards force companies to disclose a broader range of data (Rosati and Faria, 2019a) and avoid selective disclosures that only report positive developments and omit others. A mandatory reporting standard tied to the SDGs would simultaneously increase the quality of reporting and provide additional incentives for goal adoption. This would also increase the transparency of industry-level progress through more easily comparable data.

(2) More ambitious global action at the IMO level

The IMO's slow pace at translating SDG adoption into regulation is a central barrier to overcoming the lack of cohesive global action identified in Chapter 4. The lack of ambition in the IMO's regulatory agenda raised concerns from most interview participants. The IMO could level the playing field between companies bound by different regulatory regimes by tightening its restrictions. If done within the framework of its existing strategic directions, it could also provide a more direct translation of the SDGs into binding rules, thus providing a clear incentive for compliance. It would also make the goals frequently criticized as too abstract for the sector more concrete and usable for the shipping industry.

(3) Regulation incentivizing stakeholders to increase pressure

Stakeholder pressure is already one of the most effective mechanisms for increased attention and action towards sustainability. In addition to the endogenous motivation of some stakeholders that create pressure to adopt SDG targets, regulation at the national and international levels can further incentivize indirect pressure. Initiatives like the new German supply chain law or European Commission's proposal for corporate sustainability due diligence create rules that apply to a whole supply chain. By impacting the market access of actors outside of small regulatory markets, these rules can have outsized influence and incentivize stakeholders to push for greater adoption of sustainability goals.

(4) Market-based incentives

According to the triple bottom line, economic viability is one of the three main components of sustainability. Market-based incentives can connect profitability concerns and non-economic sustainability categories more strongly. Combining different market-based incentives could help to foster commitment and action for a wide range of SDGs. Tax or credit-based mechanisms can aim at SDG targets covering investments in infrastructure and energy sources like in goals 9 and 7. They can also strengthen capacity and make high-cost transitions more attainable for smaller companies. At the same time, pricing externalities like the European Union's carbon pricing system that includes the shipping industry help mitigate impact like in goal targets relating to emissions and pollution (e.g. SDGs 13, 14).

6 Conclusion

In light of the significant sustainability challenges facing the shipping industry, this paper focused on the adoption of SDGs by major shipping companies. It analysed their level of engagement with the Agenda 2030 goals through a content analysis of sustainability disclosures and interviews. It further investigated the main barriers and drivers influencing the adoption of SDGs for implementing them into organizations' sustainability strategies. The analysis reveals a limited scope of SDG engagement, focusing on specific goals related to environmental impact, education, work, and economic development. While many industry-leading companies engage widely with the framework of the SDGs, the discussion of the first research question highlights a lack of concrete commitment to match the adoption of goals. Scoring the level of engagement with the goals, the paper finds higher scores for general commitment and relevance and lower scores for measurable targets and reporting of concrete action.

Complementary interviews with industry experts provided valuable context and perspectives on the observed level of commitment to the SDGs within the sector. The content analysis and interviews demonstrated that despite general awareness of the SDGs, they are not a significant driver towards sustainable shipping. Instead, they are used merely as a reference indication or are only retroactively applied to existing sustainability strategies. To better understand this lack of engagement, this paper used the interviews to highlight key barriers and levers for increased adoption. Findings for the second research question demonstrate that while regulation and stakeholder expectations drive sustainability efforts, practical challenges hinder an enhanced integration of the SDGs into business practices. Interview responses emphasised the importance of strengthened and globally aligned regulations and the need for compulsory SDG reporting standards to establish a universal and compatible framework.

As part of a growing body of literature, this paper's findings underline the limited relevance of the SDGs in the shipping industry while highlighting its unfulfilled potential. It provides valuable insights into the shortcomings of SDG adoption, the lack of translation into concrete commitments and sector-specific problems that stand in the way of a more meaningful engagement with the Agenda 2030's goals.

6.1 Limitations

Finally, the findings of this study must be interpreted considering its limitations. Similar to the few empirical studies on the adaption of the SDGs, this study relies on secondary and available information published by the companies in their sustainability reports. The disclosed information has been used as a proxy for SDG engagement. Therefore, the findings look at the organizations' presentation rather than directly at their actions. There may be strategies, procedures, activities, measures, objectives, processes or data that companies have not commented upon in their formal sustainability reports. Accounting literature reveals that companies tend to disclose positive information while abstaining from negative news (Patten, 2002). In addition, there is a limitation with the chosen research instrument, qualitative content analysis. Using simplified indicators if and to what extent organisations reported an SDG engagement measure resulted in an advantage for companies that reported extensively. A similar limitation applies to the counting of measurable targets. According to the GRI allocation guidelines, companies that did not relate quantified targets to specific SDGs received partially multiple counts. For instance, organizations that included a target of zero container loss received a score on SDGs 3, 8, and 9, even though it is likely that most of the companies target this issue without mentioning it. This is correct as a measure for transparency and reporting, but there might be a performance-disclosure gap. As mentioned earlier, we did not seek to investigate SDG-related performance as our research focus is on SDG engagement. Thus, the chosen methodology may be biased in assessing implementation status and commitments against the SDGs.

Second, most research data is compiled from a small sample of market-leading container liner companies. Although they are the main actors in maritime cargo shipping, they represent only a fraction of the sector. In addition, the study does not include other stakeholders in maritime transport, such as charterers, flag administrations, ports, etc. Thus, the sample size is adequate for the sake of this paper but, at best, provides tendencies for this representative group rather than allowing deterministic conclusions for the entire sector.

Third, a potential shortcoming might be the coding and scoring of selected indicators when conducting the research. Even though the coding was constructed as objective, systematic and reliable, the research has been performed by a single researcher. This subjectivity might lead to minor discrepancies but should not affect the overall result significantly.

6.2 Future research opportunities

Finally, this paper has determined some lines of future research, both for sustainability studies in general and the shipping industry specifically. A broader study should assess if the results are transferable to the entire shipping industry using a larger sample size of reports. Differences in sustainability reporting should also be studied comparatively within the shipping industry (e.g., comparing bulk and container shipping) and with the entire transportation sector to judge the shipping industry's relative performance better. In addition, further research on the barriers and drivers of SDG adoption in the maritime container transportation industry is desirable. It should be based on a broad mixed-method study with a larger sample. A better understanding of the barriers and drivers would be most relevant for developing policy prescriptions.

Furthermore, the element of subjectivity that characterizes perceptions, awareness and practices of SDG engagement calls for further research and engagement of qualitative information. Such research should approach the question of engagement from the company rather than the industry perspective and better understand internal procedures, policies, operating practices, management systems and structure. These insights would allow researchers to ascertain better the process of practical implementation of CSR and SDGs throughout shipping operations.

Finally, future research should seek to bridge the disconnect between the academic literature on SDGs and private initiatives aimed at developing industry-specific reporting frameworks. Research should focus on the compatibility of reporting frameworks with Agenda 2030 and ways to enhance the quality of reporting. Given the significant room for improvement in shipping sustainability, research on the current reporting status can be a valuable resource for market actors looking to find methods to standardize and enhance reporting practices and draw attention to underreported issues. Such a development in reporting may incentivize improvements in corporate sustainability practices and help design systems better monitor industry-wide progress.

Thus, while this dissertation only sheds light on the complex interconnections between shipping and SDG-related sustainability, it demonstrates the importance of approaching shipping sustainability. Overall, this research broadens the knowledge of current approaches to SDG engagement in shipping, and this topic will continue to be relevant and dynamic in this rapidly progressing industry.

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Appendices

Appendix I. Shipping companies included in the research

Table 5: Overview of companies included in the research

Global Rank	Company	Country HQ	load capacity TEU ('000)	operated Ships (#)	market share (%)	SR available	SR year	SDG orientation	included in data sample
1	MSC (Mediterranean Shipping Company SA)	Switzerland	4.502	698	17,4%	x	2021	x	x
2	Maersk (A.P. Moller-Maersk AS)	Denmark	4.264	725	16,5%	x	2021	x	x
3	CMA CGM (Group)	France	3.335	588	12,9%	x	2021	x	x
4	COSCO (Shipping Corp. Ltd.)	China	743	106	11,1%	x	2021		
5	Hapag-Lloyd (AG)	Germany	1.761	249	6,8%	x	2021	x	x
6	Evergreen (Marine Corp. Ltd.)	Taiwan	1.606	204	6,2%	x	2021	x	x
7	ONE (Ocean Network Express Pte. Ltd.)	Singapore	1.507	201	5,8%	x	2022	x	x
8	HMM (Hyundai Merchant Marine Co. Ltd.)	South Korea	818	76	3,2%	x	2021	x	x
9	Yang Ming (Marine Transport Corp.)	Taiwan	708	95	2,7%	x	2022	x	x
10	ZIM (Integrated Shipping Services Ltd.)	Israel	516	139	2,0%	x	2021	x	x
11	Wan Hai Lines (Ltd.)	Taiwan	427	152	1,7%	x	2021	x	x
12	PIL (Pacific International Lines Pte Ltd.)	Singapore	297	91	1,1%	x	2021	x	x
13	KMTC (Korea Marine Transport Company) Co. Ltd.	South Korea	150	66	0,6%				
14	SITC (Shandong International Transport Corp.)	Hong Kong	149	102	0,6%	x	2021		
15	IRISL (Islamic Republic of Iran Shipping Lines Group)	Iran	143	32	0,6%				
16	Unifeeder (A/S)	Denmark	141	88	0,5%				
17	X-Press (Feeders Sea Consortium Pte. Ltd.)	Singapore	137	87	0,5%	x	2021		
18	Zhonggu (Logistics Corp.)	China	112	98	0,4%	x	2021		
19	T.S. Lines (Ltd.)	Taiwan	107	50	0,4%				
20	CULines (China United Lines Ltd.)	China	91	35	0,4%				
21	Antong Holdings Co. Ltd.	China	88	91	0,3%				
22	SeaLead (Shipping Pte. Ltd.)	Singapore	87	24	0,3%				
23	Sinokor (Merchant Marine Co. Ltd.)	South Korea	86	70	0,3%				
24	SM Line (Corp.)	South Korea	80	16	0,3%				
25	Global Feeder (Shipping LLC)	UAE	76	26	0,3%				
26	RCL (Regional Container Lines PCL)	Thailand	72	38	0,3%			(x)	
27	Matson (Inc.)	United States	69	29	0,3%	x	2021	x	x
28	ESL (Emirates Shipping Line DMCEST)	UAE	64	14	0,2%				
29	Swire Shipping (Pte. Ltd.)	Singapore	64	32	0,2%	x	2021	x	x
30	Arkas Line (Container Transport S.A)	Turkey	52	32	0,2%				
			22.252	4.254	94,1%	17		14	13

Note: SR=Sustainability Report

Source: Alphaliner Top 100

Appendix II. Indicators for assessing the overall level of SDG engagement

Table 6: Indicators and aspects for assessing the overall level of SDG engagement

Level of SDG commitment	SDG relevance in report	Intensions for supporting specific SDGs	Actions are taken on SDGs	KPIs/ measurable targets defined	Performance towards targets
UN Global Compact support (UNGC)	Dedicated chapter or section in the report	Directly & indirectly related to targets	Reported actions directly linked to SDGs	Number of targets	SDG-related concrete targets
The wording used in the report for SDG commitment	SDG word count	Concreteness of intentions	level of concreteness	Goal coverage of targets	indirect SDG - related concrete targets
mentioned in the strategy, roadmap materiality assessment	elaboration on SDGs vs indirect approach via Topic groups	The extent of intentions and prioritisation of goals	The extent of “meaningful” actions		

Appendix III. Interviewed industry experts

Table 7: Interviewed industry experts

Code	Stakeholder category	Interviewees' s position	Interview date & duration	Interview type
SC1	Top 10 shipping company (Europe)	Senior ESG Manager	7 Mar 2023 45 minutes	Videocall (MS Teams)
SC2	Top 10 shipping company (Europe)	ESG Officer	22 Dec 2022 50 minutes	Videocall (MS Teams)
SC3	Top 10 shipping company (Asia)	Head of Corporate Sustainability & ESG	27 Feb 2023 45 minutes	Videocall (MS Teams)
IA	National industry association (Europe)	Advisor Climate, Marine Fuels, Innovation	22 Dec 2022 40 minutes	Videocall (MS Teams)
NGO	International maritime organisation (Europe)	Senior Manager Marine Environment team	21 Dec 2022 45 minutes	Videocall (MS Teams)
PM	Policymaker / regulator (Europe)	Head of Maritime Transport & Logistics	16 Dec 2022 50 minutes	Videocall (MS Teams)