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Mumbai, India

**GOVERNING INDIRECT EMISSIONS IN  
SHIPMANAGEMENT:  
A COMPARATIVE STUDY OF GLOBAL PRACTISES**

By

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A dissertation submitted to the DG Shipping in partial fulfilment of the  
requirements for the award of the

**Certificate of Competency**

**of**

**Extra Master**

Year of passing:

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I hereby declare that this dissertation titled "Navigating Sustainability in Ship Management: Mastering the Challenge of Governing Indirect Emissions" is entirely my own work and that it has not been submitted as an exercise for a degree at this or any other university. All sources used or quoted have been cited and acknowledged fully in the references.

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## Terms and Abbreviations

**Annual COP Meetings:** The COP (Conference of the Parties) is the supreme decision-making body of the UNFCCC. All states that are parties to the Convention are represented at the COP, which reviews the implementation of the Convention and any other legal instruments the COP adopts. The first COP meeting (COP1) was held in Berlin in 1995, and the latest COP28 was held in the U.A.E. in 2023.

**Alternative Marine Power (AMP):** Also known as "cold ironing," this involves connecting a ship at port to the local electric grid to power onboard systems and reduce emissions. This is relevant to Scope 2 emissions when electricity is sourced from renewable energy.

**Biofuel** is a renewable fuel derived from biomass (plant or animal materials). Depending on their production, transportation, and use in the maritime industry, biofuels can reduce Scope 1, Scope 2, and Scope 3 emissions.

**BRSR: Business Responsibility and Sustainability Report (2021)-** Introduced by the Securities and Exchange Board of India (SEBI), is a framework for companies to report on their environmental, social, and governance (ESG) initiatives. It aims to standardise sustainability reporting, enhancing transparency in how companies manage and report their impacts on society and the environment. BRSR is a significant step in aligning Indian companies with global ESG reporting practices, encouraging more responsible and sustainable business practices. (Deloitte, 2023)

**Carbon Neutrality** is the state of net-zero carbon dioxide emissions. It can be achieved by balancing carbon dioxide emissions with their removal (often through carbon offsetting) or by eliminating emissions from society (the transition to the "post-carbon economy").

**Carbon Offsetting:** Reducing carbon dioxide or other greenhouse gas emissions to compensate for emissions made elsewhere. In the maritime industry, this can involve investing in environmental projects to balance out the carbon footprint.

**Carbon Pricing** is a method for industries to internalise the external costs of carbon emissions through mechanisms such as a carbon tax or cap-and-trade systems. It is a tool

that can incentivise the reduction of GHG emissions, impacting both Scope 2 and Scope 3 emissions.

**Carbon Disclosure Project (CDP):** A non-profit organisation that operates a global disclosure system for investors, companies, cities, states, and regions to manage their environmental impacts. It encourages entities to disclose and manage their environmental impacts, specifically focusing on their carbon footprints, water usage, and the transparency of their environmental actions. This disclosure helps stakeholders assess companies' efforts toward sustainability and environmental management. (Safdie, 2023).

**CCS: Carbon Capture and Storage:** A technology and process aimed at capturing carbon dioxide (CO<sub>2</sub>) emissions from industrial processes or power generation sources, preventing their release into the atmosphere, and storing them safely underground or in other long-term storage solutions. The primary goal of CCS is to reduce greenhouse gas emissions, mainly CO<sub>2</sub>, to mitigate climate change.

An example from the industry is Alterra Infrastructure, in collaboration with Wintershall Dea, which has received authorisation from the Norwegian Ministry of Petroleum and Energy to develop the Havstjerne CO<sub>2</sub> storage initiative in the North Sea. This aspirational project is designed to establish a comprehensive, large-scale CO<sub>2</sub> infrastructure for Europe, encompassing the collection, transportation, and secure, permanent containment of CO<sub>2</sub>. With a capacity to store up to 7 million tonnes of CO<sub>2</sub> annually, this facility represents a significant advancement in the fight against climate change. It is in line with Europe's environmental objectives. (Altera, 2023).

**Circular Economy** is an economic model that minimises waste and maximises resource efficiency. It achieves this by designing products with a view to their reuse, recycling, and regeneration (European Parliament, 2023).

**COP15 and the Copenhagen Accord (2009):** Although it fell short of achieving a binding agreement, the Copenhagen Accord recognised the need to limit global temperature increases to below 2 degrees Celsius above pre-industrial levels.

**CSR: Corporate Social Responsibility** Refers to a company's efforts to improve society in some way. CSR strategies in the maritime industry can include initiatives to reduce Scope 2 and Scope 3 emissions, demonstrating a commitment to environmental stewardship.

**Energy Efficiency Operational Indicator (EEOI):** The IMO recommends this tool for monitoring a ship's fuel efficiency. It measures the amount of CO<sub>2</sub> emitted per tonne-mile of cargo transported, helping to assess the effectiveness of strategies implemented to reduce energy consumption and emissions.

**Energy Transition:** The global energy sector's shift from fossil-based systems of energy production and consumption — including oil, natural gas, and coal — to renewable energy sources like wind, solar, and biomass. This transition impacts all scopes of emissions and is a critical aspect of sustainability strategies in the maritime industry.

**EPA:** Environmental Protection Agency. In the Indian context, the Ministry of Environment, Forest and Climate Change (MoEFCC) essentially carries out EPA functions.

**ESG—Environmental, Social, and Governance—**are the three central factors in measuring an investment's sustainability and ethical impact on a company or business.

**ESRS—European Sustainability Reporting Standards** define the Corporate Sustainability Reporting Directive (CSRD) rules. They set the structure and disclosure requirements that companies, banks, and insurance companies in scope must report on.

**EU-CSRD: EU Corporate Sustainability Reporting Directive CSRD (2023):** It aims to enhance the scope and quality of corporate sustainability reporting throughout the European Union. As the successor to the Non-Financial Reporting Directive (NFRD), CSRD aims to build upon and refine the existing framework established by the NFRD. Initiated by the European Commission, the CSRD seeks to strengthen sustainability reporting requirements by broadening the range of companies required to report. Additionally, greater detail is necessitated in these sustainability reports, and various other modifications are introduced. This shift from NFRD to CSRD signifies a significant development in the standards for corporate sustainability reporting within the European Union, indicating a move towards more comprehensive and transparent sustainability practices.

**GHG:** Greenhouse Gas

**GHG Protocol:** This widely used international accounting tool helps government and business leaders understand, quantify, and manage greenhouse gas emissions. It provides

the accounting framework for nearly every GHG standard and program globally, including the standards for Scope 1, Scope 2, and Scope 3 emissions.

**GRI: Global Reporting Initiative (1997):** A globally recognised framework organisations use to produce sustainability reports. It provides guidelines and principles for reporting various sustainability issues, including environmental, social, and economic impacts. GRI aims to standardise reporting practices, enabling organisations to communicate their sustainability performance to stakeholders transparently.

**IMO:** The International Maritime Organization was established in 1948 in London.

**Kyoto Protocol (1997).** COP3 led to the Kyoto Protocol, adopted in 1997 and entered into force in 2005. It was the first agreement under the UNFCCC to set binding obligations on industrialised countries to reduce their GHG emissions.

**Life Cycle Assessment (LCA)** is a systematic analysis of the environmental impacts of a product, process, or service throughout its entire life cycle, from raw material extraction to disposal.

**LNG (Liquefied Natural Gas):** LNG is an alternative fuel used to reduce greenhouse gas emissions in the maritime industry. It is relevant in the context of Scope 3 emissions if a shipping company's value chain includes using LNG-fuelled ships by its suppliers or through its services.

**Maritime Emissions Trading Scheme (METS):** This market-based mechanism provides economic incentives for reducing carbon emissions in the maritime industry. Depending on its design and implementation, the trading scheme can cover emissions from Scope 1, Scope 2, and Scope 3.

**Net-zero emissions** balance the amount of greenhouse gases produced and the amount removed from the atmosphere. Net zero is achieved when the amount we add is no more than the amount taken away.

**NFRD: Non-Financial Reporting Directive (2014):** The NFRD aims to enhance the transparency of certain large companies regarding social and environmental matters. It was replaced by CSRD (2023).

**Paris Agreement (2015).** A pivotal moment in UNFCCC history was COP21, held in Paris. The Paris Agreement, a legally binding international treaty on climate change, was adopted. It aims to limit global warming to below 2, preferably 1.5 degrees Celsius, compared to pre-industrial levels. Unlike the Kyoto Protocol, which sets emission reduction targets only for developed countries, the Paris Agreement requires all countries to set their targets.

**Poseidon Principles (2019).** These principles create a global framework for integrating climate considerations into lending decisions by financial institutions in the maritime shipping industry. They aim to align with the International Maritime Organization's (IMO) objective of reducing greenhouse gas emissions from shipping by at least 50% by 2050 compared to 2008. These principles guide banks in assessing and managing their ship finance portfolio's climate alignment, ensuring lending strategies support the maritime industry's transition towards lower greenhouse gas emissions.

**Renewable Energy (RE)** is energy generated from natural resources that can be replenished or regenerated, such as solar, wind, hydroelectric, and geothermal energy.

**Renewable Energy Certificates (RECs):** Instruments that certify the bearer owns a certain amount of renewable energy. Companies can purchase RECs to offset their Scope 2 emissions associated with electricity consumption.

**SEBI: Securities and Exchange Board of India:** is the regulatory authority for the securities and commodity market in India under the jurisdiction of the Ministry of Finance, Government of India. It was established on April 12, 1988, and given statutory powers on January 30, 1992, through the SEBI Act 1992. One of its notable initiatives in environmental governance is the introduction of the Business Responsibility and Sustainability Report (BRSR) in 2021.

**Sustainable Development Goals (SDGs):** A set of global goals adopted by the United Nations to address social, economic, and environmental challenges and promote sustainability by 2030.

**Sustainability-Linked Loan (SLL):** A loan instrument incentivises borrowers' achievement of sustainability performance targets, such as reducing GHG emissions across all scopes, including Scope 2 and Scope 3 emissions.



**Scope 1 emissions** are direct emissions from owned or controlled sources. This includes emissions from combustion in owned or controlled boilers, furnaces, and vehicles and chemical production in owned or controlled process equipment.

**S2E: Scope 2 Emissions** refers to indirect greenhouse gas (GHG) emissions associated with purchasing electricity, steam, heat, or cooling.

**S3E: Scope 3 Emissions** are a category of indirect greenhouse gas (GHG) emissions that occur in a company's value chain, both upstream and downstream.

**Upstream Activities:** Including the production of purchased materials, services, transportation of purchased fuels, and business travel.

**Downstream Activities:** Including the transportation of products, use of sold products, and end-of-life treatment of sold products.

**TtW (Tank-to-Wake)** is a method for calculating greenhouse gas (GHG) emissions from fuel used in a vessel. It focuses only on the emissions released during the fuel combustion while in use on the ship.

**Value Chain Emissions:** This encompasses all the emissions associated with producing, transporting, and disposing of goods and services within an organisation's supply chain. It is a broader term that includes Scope 2 and Scope 3 emissions.

**UNFCC (1992):** The United Nations Framework Convention on Climate Change (UNFCCC) was established at the Earth Summit in Rio de Janeiro in 1992. It formed a framework for action aimed at stabilising atmospheric concentrations of greenhouse gases (GHGs) to prevent dangerous anthropogenic interference with the climate system. The UNFCCC entered into force in 1994.

**Well-to-tank (WtT) emissions** are the emissions from the fuel extraction, processing, refining, and transport to the ship.

**Well-to-Wake (WtW):** Refers to the entire lifecycle emissions of a fuel, from extraction ('well') to the emissions from its end-use in a ship's engine ('wake'). It is an important concept when considering the overall impact of different fuels on Scope 3 emissions in the maritime industry.

## **b. Abstract**

This dissertation examines the strategies and the status of governing indirect emissions (Scope 2 and Scope 3) by international ship management vis-a-vis Indian ship management companies, a crucial aspect of global sustainability efforts and Carbon foot-print governance. This study analyses how these businesses navigate this complex landscape, comparing domestic and global compliance methods due to the sector's vital role in the Indian economy. As India dominates global seafarer supply and aims to boost it by 66% by 2030 (Maritime India Vision 2021), ship management companies and the related crewing supply industry must adapt to evolving international sustainability regulations.

In the context of this dissertation, shipmanagement refers specifically to companies that handle technical management, vessel crewing, or both. An Indian ship management company possesses an Indian Document of Compliance (DOC); crewing companies possess an Indian RPSL; all others are classified as international organisations.

The study uses a qualitative methodology to investigate the interaction between international sustainability regimes and practices in India. It examines potential methods for integrating global standards into local operations to improve environmental sustainability governance and enhance business models.

Findings indicate that the Indian ship management industry is responding to regulatory pressures and exploring sustainable innovations toward corporate environmental responsibility. Despite forward-thinking policies, investment in green technologies, and collaborative initiatives, findings indicate slow progress toward more sustainable operational models within the ship management industry. This suggests a disconnect between stated intentions and the pace of actual implementation.

The study emphasises the importance of proactive strategies for the Indian Shipmanagement industry to ensure its sustainable future. Additionally, it offers insights into how businesses might take a leadership role in governing indirect emissions. This approach could hold value for maritime nations seeking to enhance their environmental and economic resilience towards a circular economy.

*Keywords: Shipmanagement, Carbon Footprint, Environmental sustainability, circular economy, Corporate Environmental responsibility, Indirect emissions.*

### **c. Aims and Objectives**

This dissertation aims to comprehensively examine the evolving landscape of indirect emissions governance (Scope 2,3), particularly within India's ship management and related service industry. The focus is on analysing emerging global regulations and their impact on the Indian ship management and service sector. It evaluates the industry's current level of preparedness by assessing existing measures, planned strategies, and good practices, along with identifying opportunities and challenges. Additionally, the research investigates the general awareness within Indian ship management regarding regulatory requirements and emissions governance standards. Ultimately, the goal is to provide actionable recommendations to foster environmental sustainability and enhance the global competitiveness of Indian ship management service providers. The recommendations provide regulators with information to facilitate proactive adaptation within the sector to evolving standards.

# 1. Introduction

Climate change poses a profound and urgent challenge to our world, a crisis vividly described by UN Secretary-General Antonio Guterres in 2023. Guterres emphasises the urgency by stating, "The era of global warming has ended; the era of global boiling has arrived" (2023). Climate change is the mother of all externalities: more significant, complex, and uncertain than any other environmental problem (Tol, 2019). Effective emissions reduction policies should include three key elements: carbon pricing, technology policy, and removing barriers to behavioural change (Stern, 2006). The shipmanagement sector, a cornerstone of global trade, faces a particularly urgent need for decarbonisation, given its substantial contribution of 2.9-3% of global greenhouse gas emissions (UNCTAD, 2023; WEF, 2022). The shipmanagement industry faces the urgent challenge of decarbonisation, a critical requirement for its future operations (Hausweiler, 2022).

In response, the International Maritime Organization (IMO) has accelerated its climate goals, targeting net-zero emissions by 2050 with ambitious interim reductions (DNV, 2023). This mandate extends beyond ships, calling for a lifecycle approach to fuel emissions (Jegou et al., 2023).

The focus on managing emissions is further expanding from ships to the entire supply chain, upstream and downstream, through one regulation or another. If this regulation helps us all measure and reduce Scope 3 emissions genuinely, we need centralised EU guidance and processes (Nayar, 2023).

Companies proactively tackling indirect emissions ((Scope 2,3) stand to benefit. The transition to zero carbon can be a value-generating opportunity for shipping companies if they are proactive and purposeful rather than reactive and defensive (Almasi et al., 2022). The IMO, European Union, and national governments are driving regulatory pressure for carbon accounting. Proactive companies, shaping decarbonisation solutions and navigating emerging legislation, gain industry leadership if they address and include the Scope 2 and 3 aspects in their management system. Conversely, those who fail to adapt likely face substantial economic and sustainability risks (Crispeels et al., 2023; Nilsson, 2023).

The researcher obtained data from the organisation using verified documents, interactions and QMS services. The name and source of the data are not intentionally disclosed to maintain confidentiality and due to potential commercial implications.

## **1.1 Background of Study**

The UN's 2030 Agenda for Sustainable Development offers a blueprint for a better future, emphasising human, environmental, and economic well-being (UN, n.d.). Global environmental mandates stemming from this agenda, particularly the landmark Paris Agreement (UNFCCC, 2015), fuel the widespread adoption of sustainable practices across industries, including the shipmanagement sector. The European Union's Corporate Sustainability Reporting Directive (EU-CSR, 2023) further intensifies this focus. The European Union's comprehensive sustainability reporting directive goes beyond mere disclosure. This mandate allows executives to transform their corporate strategy by embedding sustainability, leading to new avenues of value creation (Fang et al., 2023).

While the Paris Agreement did not explicitly target the Shipmanagement sector, its overarching environmental goals and the growing emphasis on ESG reporting profoundly influence the industry. Initiatives like the Poseidon Principles (2019) directly link Shipmanagement financing to sustainability performance. India shares this commitment, as demonstrated by its Business Responsibility and Sustainability Report (EY India, 2023) and the net-zero emissions pledge by 2070 within its Nationally Determined Contributions (Kumar,2022).

Managing indirect emissions (Scope 2 and Scope 3) has become a pivotal challenge for ship management in this evolving regulatory landscape. This dissertation delves into the complexities and importance of managing indirect emissions within the Indian Shipmanagement industry and identifies possible actions to address these complexities. The dissertation illuminates the risks faced by companies that neglect this transformation and highlights the opportunities for those that proactively navigate regulatory requirements and the sustainability expectations of global clients.

## 1.2 Problem Statement

The EU's Corporate Sustainability Reporting Directive (CSRD) creates new reporting obligations, pressurising companies to align work practices with sustainability standards (Nilsson, 2023; Schiolborg, 2023). This poses challenges for the global shipmanagement sector in identifying and governing Scope 2,3 emissions in the supply chain, which historically only focused on direct (Scope 1) emissions under IMO regulations. While EU companies must track and report Scope 3 emissions from 2025, the governance of indirect emissions (Scope 2 and 3) still needs to be developed, with limited understanding and preparedness across the industry (Nayar, 2023). These emissions, stemming from energy consumption and intricate supply chain management, represent a substantial portion of the industry's greenhouse gas footprint. For shipowners, this involves emissions not just from the operation of their vessels but from the entire lifecycle of a ship – from the extraction and processing of raw materials used in ship construction to the end-of-life disposal of the vessel (Jensen, 2023).

This regulatory gap and the EU's CSRD mandate create challenges and opportunities for Indian Shipmanagement companies and related service providers. Despite their European focus, the EU's CSRD and ESRS regulations effectively set global sustainability benchmarks. With reference to these regulations the Indian companies, particularly those with business ties with organisations operating from EU, must adapt to this evolving landscape or risk losing their competitive edge and missing out on attracting eco-conscious investors and business managers. Proactive management of indirect emissions is a vital element of this adaptation (BDO,2023). Aligning with EU reporting standards can enhance their environmental credentials, fostering business viability within a decarbonising global economy (Jensen, 2023).

To effectively govern indirect emissions, Indian ship management companies and allied service industries must urgently address existing gaps and adopt holistic governance frameworks aligned with international standards. Relevant theoretical perspectives in this context include:

**Mimetic Isomorphism:** This is the process by which an institution models its behaviour on the behaviour of those companies perceived to be successful. In this case, mimicking

behaviour is encouraged not necessarily by disseminating previously private information but by the desire of companies to improve their position and acquire legitimacy, including social legitimacy (Correia et al.,2021). Competitive (Mimetic) pressures are most substantial, followed by pressures from the government (Coercive) and weakest from Normative standards (Liu et al.,2018). Indian shipmanagement companies may adopt EU-compliant practices to maintain legitimacy and partnerships within the European market while providing services to them.

**Legitimacy theory** measures society's attitude toward a corporation and its activities (Schuman,1995). Consumers and investors increasingly value sustainability. Proactive governance of indirect emissions allows Indian companies to demonstrate their commitment to environmental responsibility and gain a competitive edge in the global market.

**The Stakeholder Theory** Managers must develop relationships, inspire their stakeholders, and create communities where everyone strives to give their best to deliver the value the firm promises (Freeman et al.,2004). However, addressing emissions by Indian Shipmanagement companies strengthens relationships with EU customers and investors prioritising sustainability.

**Resource Dependence Theory** (Access to resources): Those who control critical resources have power and power influences behaviour (Nienhuser, 2008). Robust ESG performance can improve access to funding and vital resources for growth.

**Institutional Entrepreneurship:** Shaping the future: Organizations are influenced by their social and cultural environment and adjust their practices and behaviours to conform to societal norms and expectations. Proactive leadership on emissions can influence industry-wide standards and shape future partnerships inter-alia.

This urgent and complex challenge requires full-energy system thinking: understanding the timelines and interdependencies of technologies, policies, and difficult decisions (DNV, 2020). The researcher believes that doing so can offer competitive advantages for Indian companies while promoting innovation and sustainable practices in the global shipping sector.

### **1.3 Significance of Study**

This dissertation holds significant value in the context of rapidly evolving sustainability demands within the global Shipmanagement industry. Regarding the needs of the global shipmanagement industry, it explores the proactive management of indirect emissions by Indian shipmanagement service providers and directly addresses European clients' and stakeholders' increasing sustainability expectations.

The study's importance lies in its potential to bridge a knowledge gap and investigate the current state of indirect emissions governance within the ship management sector and related service industry based in India. This industry serves global clients in response to stricter regulations and global client expectations.

The study's outcome identifies proactive governance and business models that align Indian companies with international sustainability standards. This promotes environmental leadership within the industry.

This research can help Indian ship management business owners attract more clients deeply committed to environmental responsibility at a premium economic offering. Aligning with global standards enhances the market position of the Indian Marine Service industry and existing service opportunities.

### **1.4 Delimitations**

This dissertation focuses on managing indirect emissions (Scope 2 and Scope 3) within the Indian ship management and related service industry, e.g., the Training and Crewing-Supply Chain industry, particularly aligning with the needs and opportunities driven by European clients' expectations and regulations. While direct emissions (Scope 1) and environmental impacts are relevant, they received less in-depth attention in this study. The study primarily investigates the perspectives and experiences of Indian shipmanagement and service industry vis-a-vis comparable global best practices, which serve as a guide. Limited data on indirect emissions management, compliance, and innovation within the Indian Shipmanagement sector have constrained research. Additionally, the recommendations vary in effectiveness based on individual company characteristics,



resource availability, and market dynamics. Finally, it has looked into how the evolving nature of global sustainability standards could impact the long-term practicality and relevance of the recommendations.

## **1.5 Structure of the Dissertation**

**Introduction:** Establishes the background, problem statement, objectives, and significance of sustainability study within the Shipmanagement industry.

**Research Questions:** Key research questions to answer.

**Literature Review** Provides a critical analysis of existing research on indirect emissions in the Shipmanagement industry, regulatory frameworks, and sustainability practices globally. This chapter identifies gaps in knowledge and situates the current study within the existing body of work in India vis a vis best global practices, mainly EU.

**Methodology** Outlines the qualitative research design, including data collection methods (such as case studies, interviews, and analysis of industry reports) and the analytical framework used to interpret the findings. Case Studies and analyses of Indian shipmanagement companies, examining their current practices and challenges in managing indirect emissions.

**The Findings and Recommendations** This study's findings and recommendations synthesise critical insights from the case studies and literature review, highlighting challenges, opportunities, and potential solutions for proactive indirect emissions management in the Indian shipmanagement industry. Building on these insights, the study proposes a comprehensive framework to help Indian shipmanagement companies effectively govern indirect emissions, align with international standards, and meet the sustainability expectations of European clients. This framework includes actionable recommendations for implementation and evaluation.

**Conclusion** This dissertation addresses the critical knowledge gap regarding managing indirect emissions in the Indian shipmanagement sector. Key findings reveal significant takeaways. The proposed framework provides Indian shipmanagement companies with a structured approach. If effectively implemented, this framework holds the potential to reduce the industry's environmental footprint, strengthen alignment with EU practices, and

enhance India's overall maritime sustainability. Further research could explore the quantifiable impact of this framework's implementation and its potential adaptation for other emerging economies."

## 2. Research Questions

Previous research has broadly focused on Scope 1 emissions, offering valuable perspectives. Studies by Nilsson (2023), "Reporting of Scope 3 Emissions, Strategies for Newly Affected Companies", illuminate certain aspects of indirect emissions management in the non-maritime industry. However, there is a distinct lack of research on the specific economic benefits of governing indirect emissions (Scope 2 and 3) for the Indian ship management and allied service industry. This gap limits our understanding of how proactively managing indirect emissions could influence this sector's business scaling and economic advantages. Therefore, this dissertation seeks to pioneer a study into this crucial area, posing the following research questions:

- 1) What are the current governance frameworks to manage indirect emissions (Scope 2 and 3) and emission control methodologies used by the Indian shipmanagement industry vis a vis needs of Global Counterparts.?
- 2) What gaps and challenges are faced by Indian shipmanagement companies to align with evolving global regulations and sustainability targets?
- 3) What comprehensive framework can guide Indian shipmanagement companies in effective indirect emissions governance, ensuring compliance, enhancing sustainability, and fostering a competitive edge in European markets?
- 4) What strategies can Indian shipmanagement providers employ to leverage their capabilities, technology, and collaborations to assist European partners with indirect emission targets while improving their market growth?

A comprehensive literature review is conducted to address these research questions. This review examines existing frameworks and best practices for managing indirect emissions across diverse industries. Additionally, it delves into the evolving regulatory landscape and sustainability targets relevant to international shipping, focusing on European markets. Moreover, the review explores the demands and emission reduction strategies targets in the short and long term, aligning with those that make Indian ship management and allied industries derive both scaling and economic benefits. This thorough analysis of the

existing knowledge base provides a strong foundation for investigating the specific context of the Indian ship management and allied service industry.

### **3. Literature review**

#### **3.1 Introduction**

The shipmanagement industry, an essential pillar of global trade, is under increasing pressure to reduce its carbon footprint. While the focus has largely been on direct emissions (Scope 1), the intricate challenge posed by indirect emissions (Scope 2 and 3) governance throughout the supply chain is becoming more prominent. Nayar (2023), a sustainability expert from Stolt Tankers, quotes, "During our research, we discovered that while some companies are eager to take proactive measures, a majority are not fully aware of the complexities or resources required to undertake such initiatives. This lack of preparedness is not confined to small vendors but extends to many large operators". This literature review explores the fast-evolving field of indirect emissions governance within the shipmanagement sector to identify knowledge gaps in Scope 2,3 emissions governance and guide effective strategies for ship management companies.

##### **3.1.1 The Rise of Indirect Emissions Governance**

Emerging regulations, such as the European Union's Corporate Sustainability Reporting Directive (CSRD), are driving a strong focus on Scope 3 emissions accounting and reporting (Nilsson, 2023). Assessing the entire value chain by accounting and reporting Scope 3 emissions is beneficial because it leads to collaborative ways to improve efficiency and reduce environmental impacts. (Soerensen, 2023). The industry is exploring innovative solutions to address this challenge, including integrating circular economy principles focused on waste reduction, increased recycling, and sustainable practices (Arayakee, 2023).

##### **3.1.2 Rationale for Focus on Ship Management**

This dissertation centres on the governance of indirect emissions within India's shipmanagement industry, specifically focusing on crewing and technical management. These companies play a pivotal role in the supply chain. Their global reach offers a

strategic opportunity to champion sustainable practices and magnify India's influence on decarbonisation in the shipmanagement industry.

This literature review examines current industry practices, regulatory frameworks, and emerging best practice models for managing indirect emissions. Its primary goal is to synthesize existing knowledge and consolidate insights from research and practices to comprehensively understand this field. This robust foundation supports the dissertation's original findings. Additionally, the review aims to highlight critical gaps and opportunities within the current landscape. It pinpoints areas for further research and proposes actionable strategies to accelerate the shipmanagement sector's transition toward greater sustainability.

## **3.2 Indirect Emissions in Shipping**

Indirect greenhouse gas (GHG) emissions result from a company's activities occurring at sources outside the company's immediate control (GHG, n.d.). These emissions fall into three categories based on the source of emissions as explained below:

### **3.2.1 Identifying Scope1,2,3 emissions**

Scope 1 emissions refer to direct greenhouse gas emissions released from sources owned or controlled by an organisation. Examples include emissions from burning fuel in company vehicles, industrial boilers, or generators. It may also include emissions from manufacturing processes or fugitive emissions like refrigerant leaks. These emissions are a crucial focus for companies aiming to reduce their environmental impact, as organisations are directly responsible for reducing or offsetting their Scope 1 emissions.

Scope 2 emissions account for the indirect greenhouse gases released during the generation of electricity that a shipping company purchases and uses. This includes energy consumed in onshore facilities, such as company offices and warehouses. Additionally, it covers energy supplied to docked ships through "cold ironing" or "shore power," allowing ships to rely on external electricity while in port, reducing engine use and emissions.

Scope 3 emissions are the indirect greenhouse gases generated throughout a company's value chain, even outside its direct control (GHG, n.d.). These emissions often represent the most considerable portion of an organisation's carbon footprint and encompass indirect

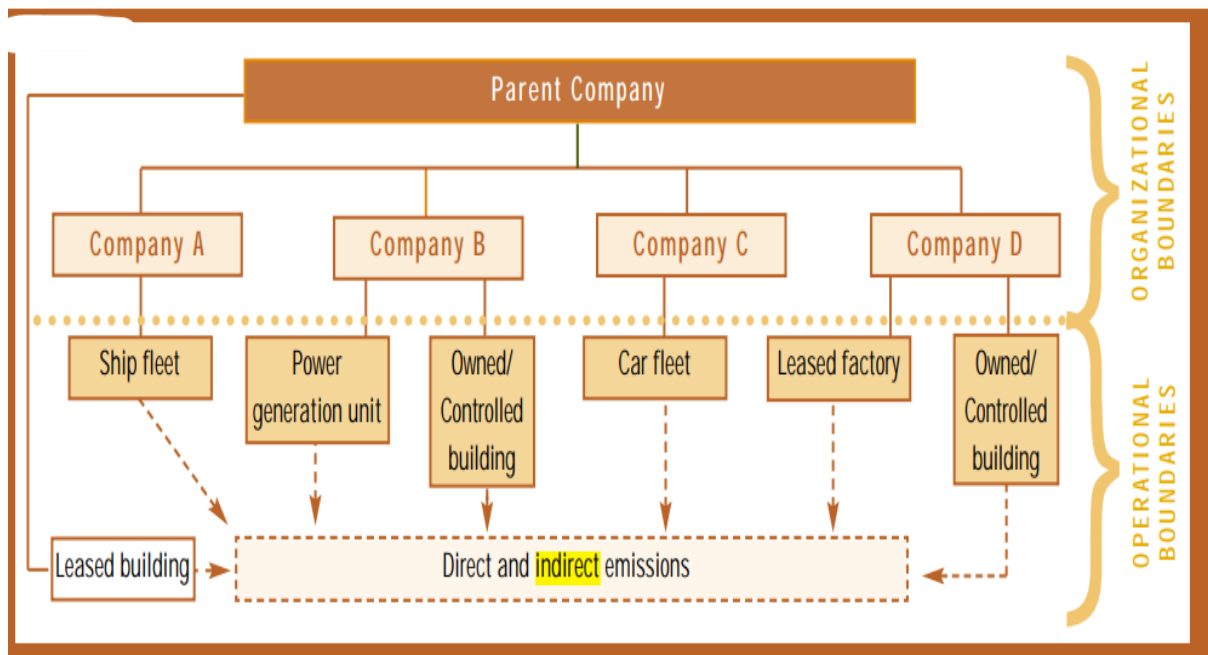
emissions generated throughout the upstream and downstream value chain, extending beyond the company's direct control. Within the shipping industry, Scope 3 emissions are remarkably diverse. These include production emissions linked to the goods and services consumed by the sector, upstream emissions associated with the extraction, production, and distribution of bunker fuels, emissions from the shipbuilding process (including raw material sourcing and processing), and maintenance-related emissions. Additionally, the logistical activities supporting shipping operations, such as transportation of parts, supplies, and crew changes, contribute to Scope 3. Business travel, employee commuting, waste disposal from ships and facilities, end-of-life ship treatment, leased assets and franchises amplify the shipping sector's Scope 3 emissions.

### **3.2.2 Challenges in Managing Indirect Emissions**

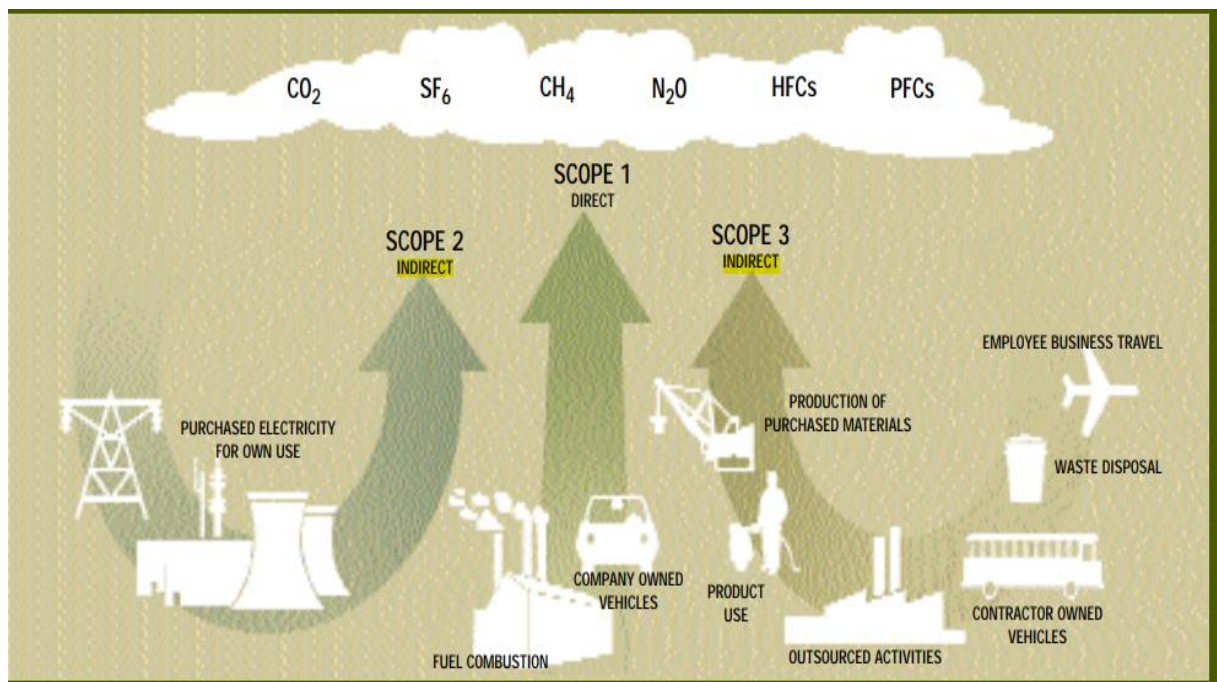
As part of its decarbonisation efforts, the ship management industry faces significant challenges in managing and reducing indirect emissions, i.e. Scope 2 and 3. Calculating these emissions is often complex, requiring a thorough understanding of their diverse sources. For Indian ship management companies, Scope 2 emissions present specific obstacles related to data transparency and ongoing regulatory changes. The lack of robust measurement and reporting standards, particularly for smaller companies, restrains accurate emissions assessments. Additionally, the regulatory landscape for Scope 2 management within India is still evolving.

As greener fuels and technologies gain traction, the focus is on indirect emissions. Particularly, Scope 3 is expected to increase (Jensen, 2023).

Managing Scope 3 emissions in ship management is complicated due to the industry's vast, interdependent supply chain (Fig 1). Challenges include a need for standardised data, limited direct influence over suppliers, and the complexity of tracking upstream and downstream emissions (Fig 2).



**Figure 1.** *Organisational and Operational Boundaries of a Company*  
Source: GHG Protocol (n.d.), A Corporate Accounting and Reporting Standard



**Figure 2.** *Overview of scopes and emissions across a value chain*  
Source: GHG Protocol (n.d.), A Corporate Accounting and Reporting Standard



Governing Scope 3 emissions in ship management presents unique challenges. One critical issue is the potential for double-counting by interconnected organisations for commercial purposes, among other things. Since different actors within the supply chain may report overlapping emissions for Scope 1 (direct) and Scope 3 (indirect), inflated totals can arise. Transparent methodologies established by organisations like the GHG Protocol are essential to prevent such errors (GHG Protocol, n.d.).

A second challenge involves contractual ambiguity. Charter agreements, such as voyage or time charters, often need more clarity regarding who reports emissions. Typically, the party paying for fuel reports Scope 1 emissions, while the other party reports Scope 3. This lack of clarity can obscure the total emissions associated with a particular vessel (Soerensen, 2024).

Furthermore, conjectural evidence causes data limitations, which can hinder the reliability of Scope 3 assessments. Ship management companies rely heavily on external information regarding Scope 3 sources, such as fuel production, shipyards, and ports. Unfortunately, this data can be scarce or unreliable, posing challenges for accurate measurement.

Finally, the lack of standardised calculation methodologies for indirect emissions impedes industry-wide benchmarking and comprehensive progress tracking. Without consistent methods, it becomes difficult to compare the performance of different companies or measure overall progress towards decarbonisation goals.

### **3.3 Global Sustainability Frameworks and Evolving Governance**

#### **3.3.1 Global Regulatory Overview**

The shipmanagement sector faces a complex and rapidly evolving regulatory landscape focused on sustainability. Shipping companies face a highly uncertain regulatory environment (Jameson, 2021). As the company contracting the services, we are responsible for auditing our suppliers on price, service, and Scope 3 emissions (Nayar, 2023). The European regulatory landscape is mainly dynamic with initiatives like the CSRD, requiring shipping companies to prepare for early adoption and alignment (Schjolborg, 2024).

Understanding the interplay between shipping-specific regulations and the broader landscape of global sustainability agreements is crucial, as these frameworks collectively drive progress within the industry. International agreements, such as the Paris Agreement, UN Sustainable Development Goals, and the IMO's decarbonisation targets, establish overarching standards and ambitions. Additionally, specialised regulatory bodies, like the EU's CSRD, influence the shipping industry through spillover effects from more expansive corporate sustainability mandates. Finally, industry-led initiatives, such as the Poseidon Principles and the Sea Cargo Charter, illustrate a growing sector-specific commitment to sustainable finance and highlight the proactive role the shipping industry can play in addressing its environmental impact.

The interconnectedness presents complex reporting challenges, as Scope 1 emissions in one industry segment may become Scope 3 in another. The mounting pressure from investors and customers for transparent, comprehensive sustainability data underscores this complexity (Nilsson, 2023). A thorough literature review is essential to clarify this landscape and support effective indirect emissions governance strategies within the shipmanagement industry.

### **3.3.2 Overview of International Regulations**

#### **The Paris Agreement**

The Paris Agreement (2015) is the global framework for addressing climate change. Its goal is to keep global warming below 2 degrees Celsius, preferably to 1.5 degrees Celsius, compared to pre-industrial levels. While the agreement does not directly regulate the maritime and shipmanagement industry (covered under IMO regulations), its overarching goals significantly influence its decarbonisation trajectory (Larkin, 2014).

The European Union enacted the European Climate Law and the European Green Deal to align with the Paris Agreement's objectives. The Climate Law legally enshrines the goal of climate neutrality by 2050 (EC, n.d.). Initiatives like the Corporate Sustainability Reporting Directive (CSRD), adopted in November 2022, directly support the Green Deal's aims (Deloitte, 2023). These measures create significant regulatory pressure on the shipmanagement industry, with indirect emissions reporting becoming an essential element

of compliance. This underscores the urgency for ship management companies to develop robust decarbonisation strategies that align with the broader global climate goals outlined in the Paris Agreement.

### **IMO's Role: Regulations and Their Shortcomings**

The International Maritime Organization (IMO) plays a crucial role in governing ship-based emissions. Initially focused on Scope 1 emissions, its 2018 strategy aimed for a 50% reduction in GHG emissions by 2050, a target criticised as insufficiently aligned with the Paris Agreement's goals (Comer, 2023). The initial strategy (2018) was incompatible with the Paris Agreement's aim to limit global warming to well below two °C and pursue efforts to limit it to 1.5°C. However, in 2023 (MEPC 80), the IMO significantly revised this strategy, targeting net zero emissions by 2050 and adopting a life cycle approach to emissions reduction (IMO, 2023; DNV-MEPC 80, 2023).

This revised strategy now encompasses "well-to-wake" (WtW) emissions, addressing every stage of a fuel's life cycle – production, transport, storage, and onboard use (Hellenic News, 2021; Class NK, 2023). Expanding the regulatory scope highlights the growing importance of indirect emissions in the shipmanagement sector's overall environmental impact.

While the IMO's EEXI and CII regulations, both in force since 2023, are a positive step, their impact on reducing overall emissions is considered limited (Comer, 2023). The EEXI is not sufficiently rigorous—it is expected to avoid about 1% of future emissions by 2030—and the CII merely grades ships from A to E. However, both measures are set to be revised by January 1, 2026. Changing these to be more effective can include regulating CO<sub>2</sub>e emissions, not just CO<sub>2</sub>, covering WTW emissions under CII, and increasing their required emissions reductions. The Energy Efficiency Operational Indicator (EEOI) tool is recommended by IMO as a measurement tool but is not mandatory.

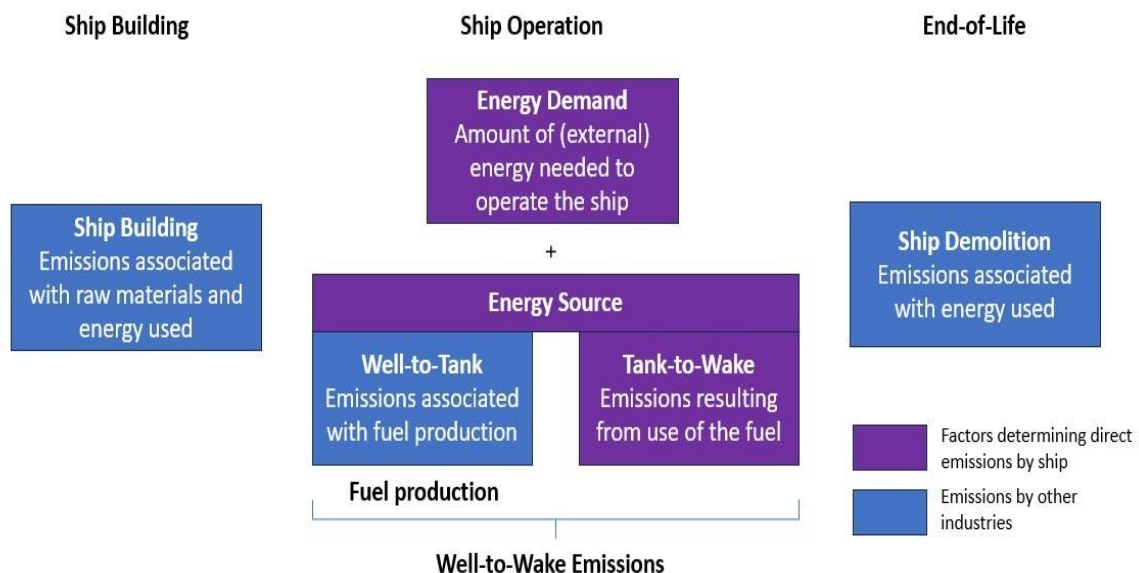
The scope of GHG emissions has been expanded to include emissions across the entire life cycle of the value chain, from manufacturing, transportation, and storage to onboard use for the fuels used by ships—WtW emissions or well-to-wake emissions (Class NK, 2023). Well-to-wake emissions include measurement of well-to-tank and tank-to-wake.

A key challenge lies in the IMO's limited regulatory authority only for merchant ships. While they can govern ship-based emissions, most upstream fuel production (TtW) emissions occur on land, falling under national regulations (Bouwel, 2023). This creates a complex governance landscape with a potential gap in accountability for indirect emissions. From the shipowner's perspective, a ship's entire life cycle emissions (Fig 3) can be divided into four categories:

- Ship Manufacturing: Indirect emissions (Scope 3)
- Operational Energy Demand: Direct emissions (Scope 1)
- Fuel Production: Largely indirect, regulated nationally
- End-of-Life Disposal: Indirect emissions (Scope 3)
- Corporate Office/Warehouse emissions (Scope 2)

Evolving governance emphasises the need for ship management companies to adopt a holistic view of Scope 2 and 3 emissions, going beyond the IMO's direct focus on Scope 1 and proactively addressing indirect emissions to meet evolving sustainability demands.

## Life Cycle View of Shipping Emissions



**Figure 3.** *Lifecycle View of Shipping Emissions*

Source: "Tank-to-Wake or Well-to-Wake, what basis to use when addressing shipping GHG emissions?" by E. Van Bouwel, 2023, LinkedIn

## **EU's Initiatives- CSRD: Driving Accountability**

The European Union is leading in driving sustainability in the shipmanagement sector. Its Corporate Sustainability Reporting Directive (CSRD), replacing the Non-Financial Reporting Directive, significantly expands mandatory reporting requirements for companies operating in the EU (European Commission, 2021). CSRD mandates comprehensive reporting on environmental, social, and governance (ESG) factors, strongly focusing on Scope 3 emissions from upstream and downstream value chain activities (Schmidt, 2024).

The CSRD's focus on indirect emissions has far-reaching implications for the global shipmanagement industry. It directly impacts shipping companies operating within the EU and reverberates through supply chains worldwide. To maintain market access and comply with customer expectations, ship management companies are increasingly incentivised to improve their indirect emissions governance and reporting, even if not directly mandated by the CSRD.

Regarding CSRD compliance, large companies, such as cargo owners, retailers or manufacturers, have already committed to reporting on, for example, their scope three emissions, which encompasses their supply chain. (Schjolborg, 2024).

“While a company may not fall within its scope, the effects of the CSRD could soon reach your operations – even outside the EU. Is your company aware and prepared?” quotes Schjolborg (2024).

### **CSRD reporting requirements (Schmidt,2024)**

2024 (reports due 2025): Applies to companies already under NFRD

2025 (reports due 2026): Expands to all large companies in the EU, including non-EU subsidiaries

2026 (reports due 2027): Includes listed small and medium-sized entities (SMEs)

2028 (reports due 2029): Non-EU parent companies with significant EU presence must report on the whole global group

### 3.3.3 International Industry-led Initiatives

#### **The Poseidon Principles: Shifting Financial Levers**

As defined previously, the Poseidon Principles is a financial sector initiative to support global decarbonisation efforts. Signatories to the Poseidon Principles are committed to improving the role of maritime finance in tackling shipping's climate impacts (Global Maritime Forum, 2023). The expectation behind the Poseidon Principles is that signatories not aligned with the IMO 2050 trajectory may want to improve their emission profiles (NSA, 2021).

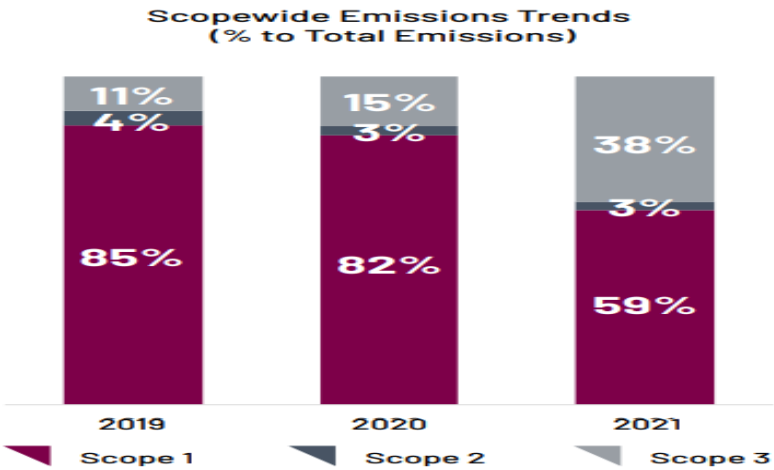
Although primarily focused on direct emissions (Scope 1), the Poseidon Principles hold broader significance for indirect emissions (S2E and S3E) governance. By promoting a holistic evaluation of a shipping company's environmental footprint, they indirectly incentivise attention to Scope 2 and 3 emissions. Focusing on a company's broader environmental impact aligns with the increasing emphasis on sustainability within the shipmanagement finance sector.

Assessing the entire value chain by accounting and reporting scope three emissions is beneficial because it leads to collaborative ways to improve efficiency and reduce environmental impacts. (Soerensen,2023)

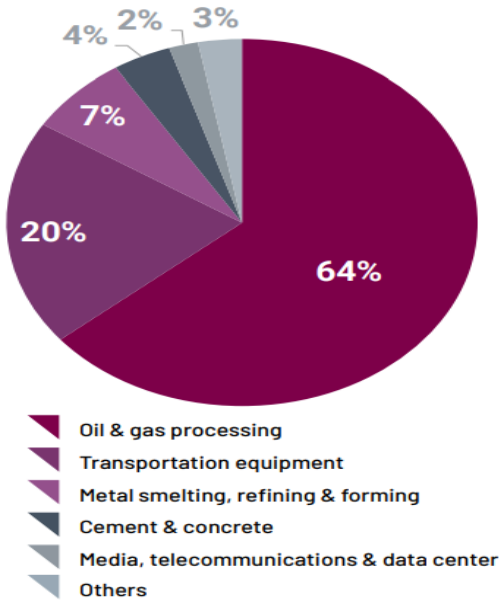
**Sea Cargo Charter (SCC)** or the Getting to Zero Coalition provides platforms for setting emissions reduction ambitions and aligning actions. However, their voluntary nature and potential for varying interpretations can limit their impact. The Sea Cargo Charter (SCC), established in 2020, further demonstrates the industry's proactive stance. Formed by charterers involved in drafting the Poseidon Principles, the SCC focuses on transparent emissions reporting (Sample format published by GHG platform) throughout the value chain, including Scope 3 (SCC, 2023).

**CDP** is an international non-profit organisation that helps companies, cities, states, regions, and public authorities disclose their environmental impacts. The CDP framework is a voluntary reporting framework companies use to disclose environmental information to their stakeholders (Business Today, 2022).

CDP data (2022) illustrates this dynamic (Fig 4, Fig 5). In 2021, Scope 1 carbon emissions increased marginally (1%), Scope 2 emissions rose more substantially (34%), while Scope 3 emissions saw a considerable increase (249%). This shift was partially driven by companies outsourcing activities, resulting in reduced Scope 1 emissions (-23%) and static Scope 2 figures (3%). The substantial rise in Scope 3 emissions underscores the need for companies to engage with value chain partners for collective decarbonisation efforts.



**Figure 4. Scopewise Emissions Trends**  
Source: CDP, Decarbonizing India: Driving Climate Action Through Disclosure2022



**Figure 5. Scope 3 emissions, Sectoral Breakdowns**  
Source: CDP, Decarbonizing India: Driving Climate Action Through Disclosure2021

### 3.3.4 National Regulations

**BRSR (SEBI, India):** The Business Responsibility and Sustainability Report (BRSR) mandated by SEBI represents a significant shift in sustainability reporting for Indian companies. The BRSR framework is a mandatory disclosure mechanism for the top 1000 listed companies or businesses to report their performance in environmental, social, and governance (ESG) aspects and demonstrate their commitment to responsible business practices. Its mandatory components focus primarily on Scope 1 and 2 emissions, driving increased transparency for the shipping industry. While Scope 3 reporting remains optional, the BRSR's emphasis on environmental responsibility may encourage shipping companies listed on the stock exchange in India to begin measuring and addressing these more comprehensive indirect emissions. Shipping companies can position themselves favourably in a rapidly evolving market landscape by anticipating future regulations and demonstrating proactive sustainability leadership.

### 3.3.5 Analysis of the alignment between international and national regulations

The CSRD, Poseidon Principles, and the IMO's revised strategies greatly emphasise shipmanagement decarbonisation. The CSRD's focus on Scope 1, 2, and 3 reporting is particularly significant, potentially impacting companies outside the EU through supply chain integration (Schiolborg, 2024).

While initiatives like the CSRD mark substantial progress, critical challenges in governing indirect emissions persist, particularly in India. The CSRD's focus highlights the complex nature of indirect emissions throughout a company's value chain. Amplified within the global shipping industry, this complexity poses a significant obstacle to reliable data collection (Psaraftis & Kontovas, 2021). Furthermore, the lack of universal calculation standards for indirect emissions creates inconsistencies and makes it challenging to establish industry-wide benchmarks. Finally, effective enforcement mechanisms, such as mandatory compliance, are essential. This presents a unique challenge for Scope 2,3 emissions, as they often lie partially outside direct regulatory control.



### 3.3.6 Essential Areas for Collaboration

Data-sharing platforms that promote transparency throughout shipmanagement supply chains are necessary to streamline emissions tracking and pinpoint potential areas for improvement. This ensures consistent and comparable data across organisations. Robust enforcement mechanisms must be established to guarantee accountability and incentivise real change in indirect emissions governance. Finally, it is essential to understand the link between company-level action and national goals. While Scope 3 emissions directly impact companies, collective corporate efforts to reduce these emissions can significantly contribute to national net-zero objectives. Recognising this connection can empower companies and promote better alignment between industry and government sustainability targets. Governance frameworks which influence the carbon footprint initiatives of organisations with global clients are mentioned in Table 1.

Framework	Strengths	Limitations
BRSR(India)	Mandates ESG reporting for top-listed companies. Includes Scope 1 and 2 emissions reporting.	Lacks explicit reduction targets for direct and indirect emissions. Scope 3 reporting remains optional.
CSRD (EU)	Requires comprehensive sustainability reporting, including Scope 3, for larger EU-based companies.	It may indirectly impact Indian companies through global supply chain integration.
Industry Initiatives (e.g., CDP, SCC)	Provide platforms for goal-setting and transparency. Offer methodologies for emissions calculations.	Due to their voluntary nature, varying interpretations limit their impact. They may have limited applicability outside specific sectors (e.g., container shipping).

<b>Poseidon Principles</b>	It provides precise alignment assessments for ship finance portfolios with climate goals and offers a standardised framework specifically for the maritime sector.	A focus on ship financing may only partially address the complexities of Scope 3 emissions across the broader maritime supply chain.
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**Table 1:** *Strength and Limitations comparison of major carbon footprint governance frameworks.*

Source: Researcher adaptation

### 3.3.7 Industry Response: Evolving Awareness and Emerging Solutions

The industry's response to indirect emissions in ship management is evolving globally and in India. Even though EU companies are required to track and report their Scope 3 emissions from 2025, there is a general need for more understanding and preparedness for the considerable effort this involves (Nayar, 2023). The new rules—CSRD—significantly impact industries, bringing challenges and changes to companies and their practices (Schiolborg, 2023).

Current practices reveal uneven awareness regarding Scope 3 emissions across ship management companies. Proactive companies, particularly those impacted by EU CSRD regulations, focus more on indirect emissions. However, smaller firms outside the EU often need to be more engaged. While emerging partnerships amongst ship managers, fuel suppliers, shipyards, environmental groups, and port authorities signal a shift towards collaboration, the industry recognises a need for comprehensive governance frameworks explicitly designed for ship management and allied service industries. These frameworks are crucial for standardised emissions accounting and reporting, data transparency, supply chain collaboration, and clear reduction targets. While positive trends exist now, the industry maintains a largely reactive stance. The CSRD's implementation likely accelerates action, but current fragmented progress risks falling short of the urgency of the decarbonisation challenge, highlighting the need for proactive and standardised approaches.

## **3.4 Drivers of Sustainability in Ship Management**

### **3.4.1 International regulations and their impact on ship management practices**

While the CSRD's direct scope may initially encompass only some companies, its influence extends to supply chains and partnerships beyond the EU (Schjolborg, 2024). Hence, Indian companies with global operations and aspirations must proactively align their reporting practices with these international standards to remain competitive, attract investments, and address evolving stakeholder expectations (BDO, 2023; Deloitte, 2023).

### **3.4.2 Stakeholder Expectations: Market Dynamics: Shifting Expectations**

The shipmanagement industry is transforming, and sustainability practices are increasing. Stakeholders across the shipmanagement value chain are placing greater emphasis on sustainability. Customers, investors, and communities increasingly expect responsible practices (Henisz et al., 2019). Investor focus on Environmental, Social, and Governance (ESG) performance is rising, favouring companies with strong sustainability records. Cargo owners and charterers prioritise their business partners with lower emissions to reduce their Scope 3 impact and meet consumer demands. These trends pressure the shipmanagement sector to decarbonise and demonstrate commitment to emissions management, which is seen as a strategic necessity and a potential competitive advantage.

### **3.4.3 Beyond Compliance: The Business Case for Sustainability in Shipping**

The shipping industry is experiencing a significant shift towards sustainability, and understanding the evolving market, tangible benefits, and the specific context of Indian ship management companies and allied service industry is crucial for successfully navigating this change. Proactively managing both direct and indirect emissions offers ship management companies distinct advantages. A robust sustainability commitment enhances

reputation, attracting environmentally conscious customers, partners, and employees while bolstering a company's standing within the industry. Additionally, reducing emissions often aligns with fuel efficiency and cost-saving initiatives. Maximising operational efficiency mitigates the costs associated with the sustainability transition and lessens the risks associated with fluctuating fuel prices (Smith et al., 2021). Furthermore, companies are demonstrating strong Environmental, Social, and Governance (ESG) performance benefit from improved access to capital and may secure more favourable financing terms (Jameson et al., 2021).

#### **3.4.4 Technological Innovation: Energy efficiency and Digital solutions**

The shipmanagement industry's journey towards decarbonisation, including the governance of indirect emissions, hinges on developing a knowledge hub, technological innovation, IT platforms and unprecedented cross-sector collaboration. Adequate resource allocation ensures that organisations have the necessary personnel, expertise, and technology to effectively address sustainability challenges and comply with regulations such as the CSRD (Nilsson, 2023). The tools and processes chosen to report data depend upon the information and communication infrastructure already in place (i.e., how easy it is to include new data categories in corporate databases). It also depends upon the amount of detail that corporate headquarters wishes to be reported from facilities (GHG, n.d.). This section analyses how key industry segments, mainly manning and technical management, including ship repairs, shipbuilding, and ports, can leverage emerging technologies and collaborative models to drive sustainable transformation. It emphasises the urgent need for investment to support this transition.

Emerging technologies and cross-sector collaborations can reduce indirect emissions across the value chain. While the shipmanagement industry comprises distinct sectors with specific challenges, several emerging technologies promise to lower indirect emissions throughout the value chain. Energy-saving designs and sustainable fuels, such as biofuels, hydrogen, and ammonia, can decarbonise, benefiting both ship operations and energy use in shipyards and emissions related to port activity (DNV, 2020). Additionally, goal-based ship design, retrofits, operational optimisation, and digitalisation advancements present valuable efficiency gains, impacting the emissions profile of shipyards, ports, and vessel

operations (Johnson, 2019). Furthermore, new materials, construction techniques, and waste reduction strategies within the shipbuilding and repair sectors have the potential to minimise their emissions footprint significantly. Effective mitigation measures should be holistically considered through the lenses of human factors, technology, operations, policy, regulations, and economics for comprehensive impact (Vakili, 2023). Finally, digital tools can reduce indirect emissions by optimising crew scheduling and travel, lessening the carbon footprint associated with crew changes and shoreside personnel movements.

### **3.5 Governing Indirect Emissions: Obstacles and Opportunities**

There is an urgent need to develop comprehensive governance frameworks for indirect emissions. The absence of globally or regionally binding regulations leads to fragmented approaches to managing Scope 3 emissions and hinders consistent progress. Additionally, the shipmanagement industry's diverse structure, encompassing multiple stakeholders and complex supply chains, makes establishing and enforcing unified standards complex. Furthermore, even when voluntary frameworks exist, insufficient monitoring and enforcement mechanisms increase the risk of greenwashing and ultimately undermine genuine emission reduction efforts.

### **3.6 Exploring Governance Models for Sustainability in Shipping**

#### **3.6.1 Government Initiatives for Sustainable Shipping- India:**

The Indian government and DG Shipping are working with the IMO to develop a revised net-zero emissions strategy, recognising the challenges of achieving net zero too quickly across all sectors due to potential resource constraints (India-GOI, 2022). Despite the focus on S1E (Scope 1 Emissions), the discussion on governance frameworks for Scope 2 and Scope 3 emissions remains underdeveloped. This presents an opportunity for DG Shipping to raise awareness among Indian ship management companies regarding the challenges of implementing effective governance for S2E (Scope 2 Emissions) and S3E (Scope 3 Emissions)

However, to address the need for greener shipping, the Government of India (GOI) is establishing centres of excellence to develop solutions for reducing direct and indirect emissions. A notable initiative is India's first National Centre of Excellence for Green Port & Shipping (NCoEGPS). Additionally, India plans to significantly increase the use of renewable energy in major ports, aiming for a 60% share of total power demand (PIB, 2022).

Following a life cycle assessment (LCA) approach, these initiatives are expected to significantly reduce scope and Scope 2 and 3 emissions of shipowners and cargo owners.

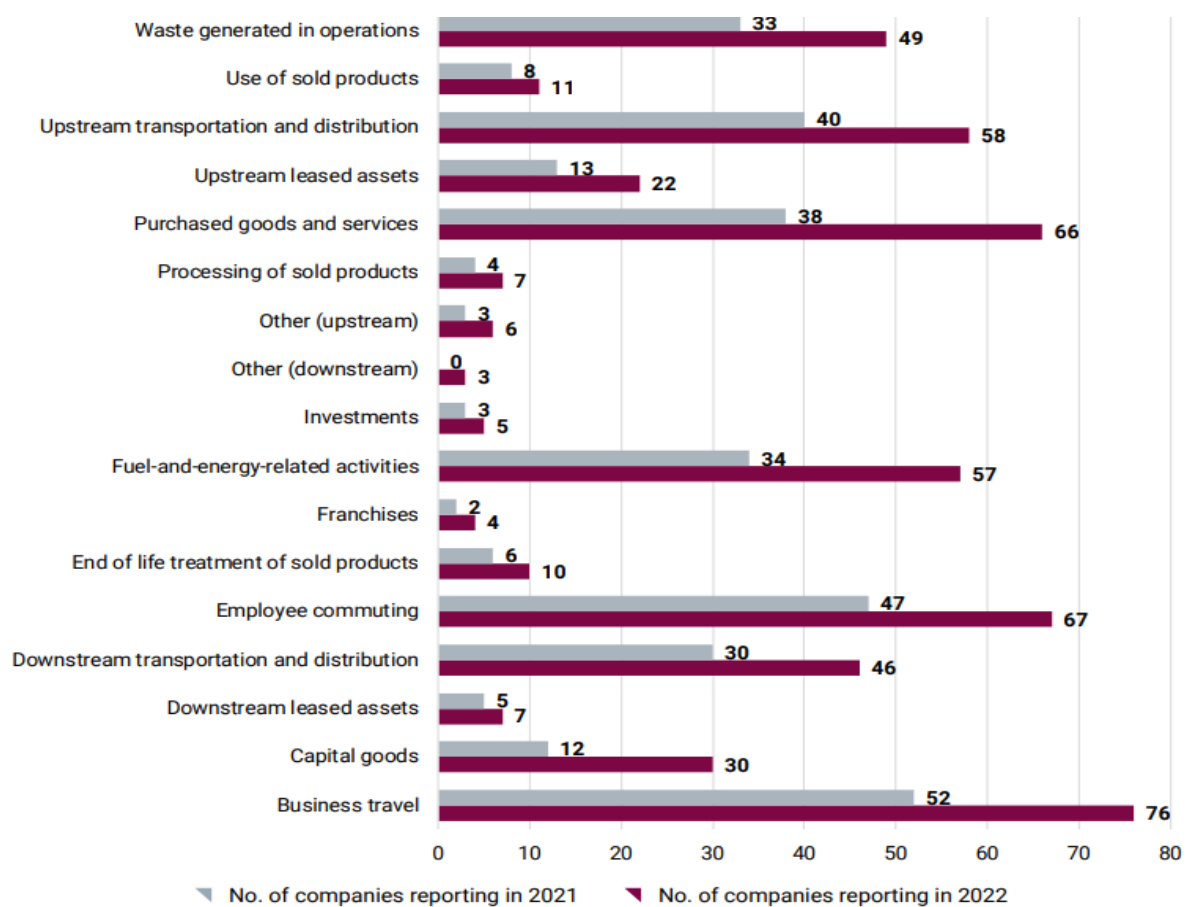
### **3.6.2 Industry Initiatives: Emissions Tracking:**

A literature review of Sustainability reports and data available highlights various initiatives the industry implements for measuring Scope 1,2,3 emissions. Shipowners based in Europe have better-defined means of governance than ship-management companies in Europe and also in comparison to shipowners or ship-management companies based in geographies other than Europe.

Well-established governance mechanisms in Europe serve as a learning tool for organisations in other geographies.

### **3.6.3 Best Practices- India Allied Industries:**

India's commitment to tackling climate change is evident in the surge of companies adopting science-based targets (SBTi). A 59% increase in Indian companies setting SBTi commitments demonstrates a shift towards quantifiable emissions reduction goals. This progress is further supported by increased reporting on Scope 3 emissions, crucial for achieving comprehensive industrial decarbonisation (CDP, India 2022) Fig 6.



**Figure 6.** *Scope 3 categories reported in 2022 and 2021*

Source: CDP (2022), Decarbonizing India: Driving Climate Action Through Disclosure2022

### 3.7 The EU's Corporate Sustainability Reporting Directive (CSRD): Potential Impacts on Indian Ship Management and Allied Service Industries

The EU's Corporate Sustainability Reporting Directive (CSRD) brings opportunities and challenges to Indian ship management companies as the focus on ESG grows globally. By proactively reducing indirect emissions, companies can benefit from aligning with European clients who want greener supply chains. Further, aligning with CSRD and incorporating international reporting standards (ESRS and BRSR) can improve risk management and boost reputation (BDO, 2023). However, challenges include the cost of sustainable upgrades, navigating complex regulations, acquiring emissions tracking and reporting skills, and meeting the CSRD's broader reporting demands. To succeed, Indian

companies should partner with stakeholders related to Scope 3 emissions, invest in digital emissions monitoring, build in-house sustainability expertise, and proactively adopt CSRD/ESRS principles defined by the EU Directive to meet evolving investor expectations.

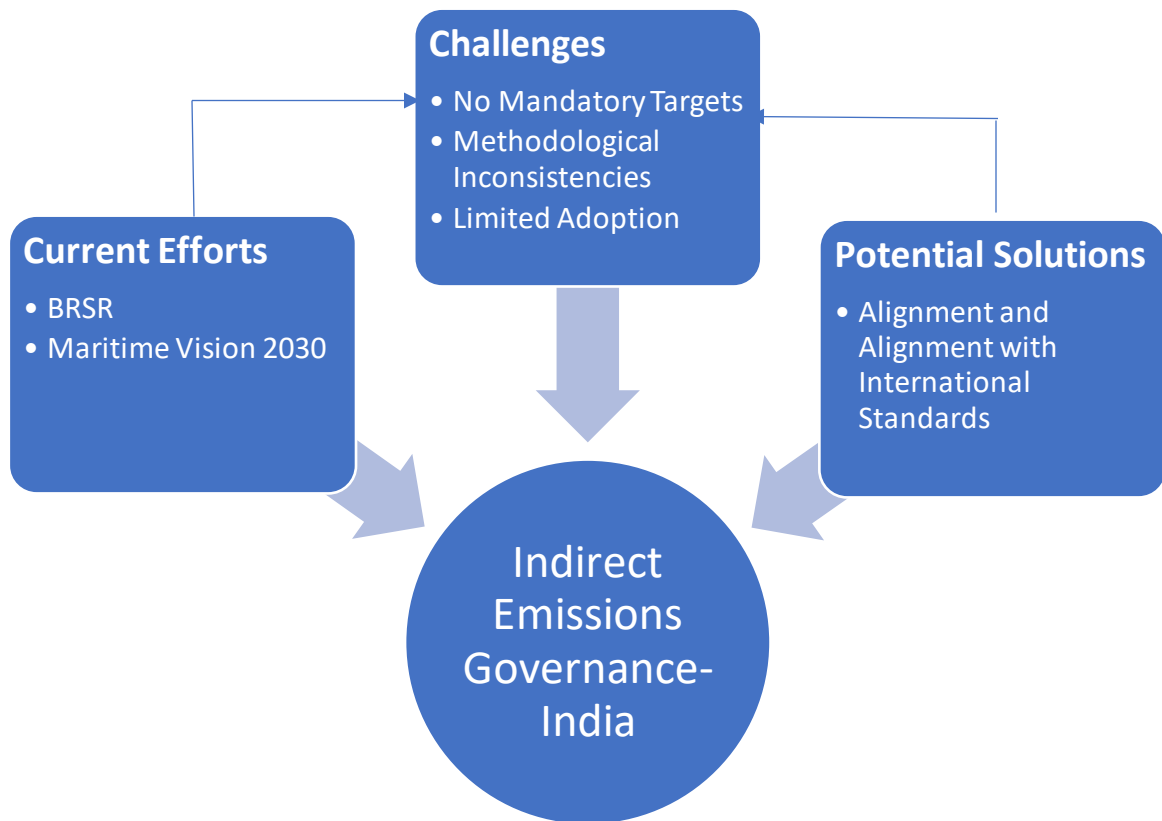
### **3.8 Theoretical Underpinnings**

Existing frameworks indicate progress in addressing Scope 2 and Scope 3 emissions. However, the absence of mandatory targets, methodological inconsistencies, and limited industry-wide adoption presents significant challenges (Fig 7).

It is promising to see Indian industries are consciously attempting to mitigate climate change. However, one must recognise that if we achieve a net-zero target by 2050, the pace needs to be picked up, as does the number of companies taking accountability and reporting to CDP (CDP,2022). Therefore, in addition to S1E, the S2E and S3E governance must be well emphasised.

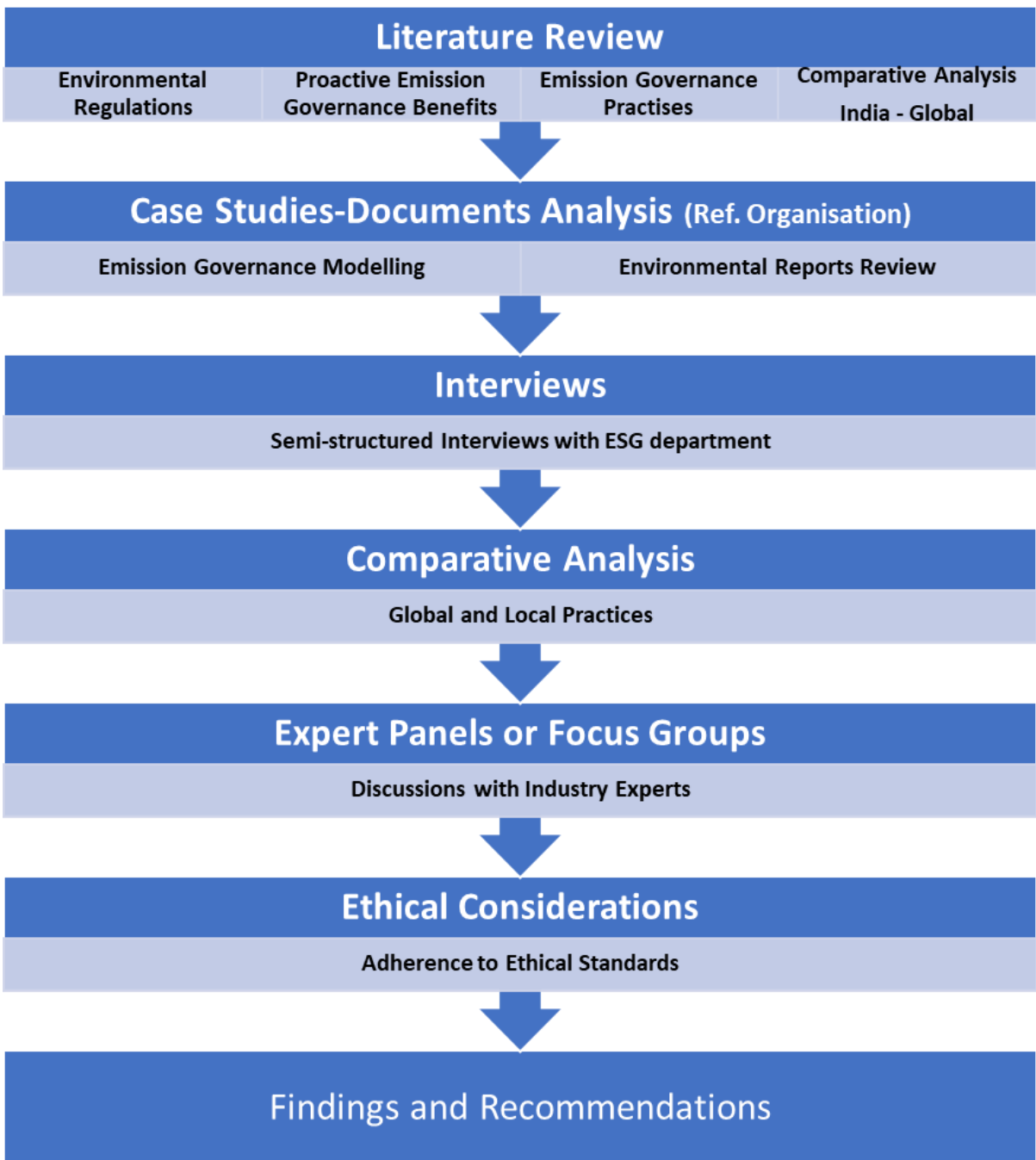
While ESRS and BRSR have unique characteristics, there are clear overlaps between the two frameworks. By aligning their reporting practices with international standards and incorporating the common elements of ESRS and BRSR, Indian companies can enhance the credibility and comparability of their sustainability disclosures. (BDO,2023).





**Figure 7:** *Relations of Theoretical Underpinning elements*  
Source: Researcher

## 4. Research Methodology



**Figure 8:** *Research Methodology Flowchart (Source: Researcher)*

## **4.1 Methodological Approach and Justification**

This dissertation employs a qualitative research approach, specifically adopting multiple case study designs. This methodology is well-suited for gaining in-depth insights into stakeholder perspectives, strategic management practices, and the multifaceted challenges surrounding sustainability initiatives within the shipmanagement industry. (Pinto,2023) cited Eisenhardt and Yin, who suggested that a multiple case study design allows for a broader analysis of emergent themes and strengthens the external validity of the findings, particularly in contexts where the researcher has limited control over events and aims to explore real-world phenomena. Qualitative research methods empower researchers to investigate a phenomenon through individuals' experiences and perceptions (Sofier-Man, 2010). Therefore, qualitative research is robust in nature. Pinto's research further cites evidence from research of Eisenhardt (1989), Pagel (2009) and Walker (2012), highlighting that while the number of cases can vary, research suggests an optimal range of three to eleven for manageability and in-depth analysis (Pinto, 2023). This study includes ten large, globally operating firms with diverse geographies, sizes, and business models, having been operational for a minimum of a decade.

## **4.2 Sample Selection Overview- Inclusion and Exclusion Criteria**

This study employed a purposive sampling strategy to select eight organisations (including 40 employees) for case study analysis, as depicted in interview data section 5.4. The sample represents a diverse range of continental demographics within the shipmanagement industry, including locations in Asia, Europe, and North America (India, Qatar, Hong Kong, Denmark, Norway, Germany, and Canada). Organisations were chosen to reflect variations in the industry's key operational and managerial characteristics (Table 2).

This study focuses on implementing ESG sustainability initiatives within global shipmanagement organisations. The following inclusion criteria ensure relevance and focused insights: Organizations must have demonstrable business operations across multiple countries and be directly involved in crewing/manning, ship ownership, or technical management within the shipmanagement industry. Participants must hold mid-

level or senior positions directly involved in implementing or reporting ESG/sustainability initiatives within designated ship management or sustainability departments. Additionally, as exclusion criteria, only genuine data sources published are considered. Organisations without core functions directly linked to ship management are excluded from the study.

Sr No	Company Type	Head Office	Sample Size (Organisation /Employees)	Operations in India
1	Shipowners with technical Management -Case Analysis 1, Pg 37 -Case Analysis 2, Pg 38 -Case Analysis 3, Pg 39 -Case Analysis 4, Pg 41	Europe, Canada	4/12	Technical and Crew Management,>40Ships each company
2	Shipowners with technical Management -Case Analysis 5, Pg 43	Middle East- Govt Owned	1/5	Technical and Crew Management >60 Ships
3	4 Shipmanagement ISM company (non-ownership). -Case Analysis 6, Pg 44	Hong Kong, Singapore, Cyprus	4/17	Crewing-Manning Fleet size> 1500 Ships
4	Shipowners with technical Management -Case Analysis 7, Pg 44	India – Govt	1/3	Technical and Crew Management Fleet Size > 54 Ships
5	Shipowners with technical Management -Case Analysis 8, Pg 44	India – Pvt Listed on NSE	1/3	Technical and Crew Management >60 Ships

**Table 2:** *Case Study- Sample Study*

Source: Researcher adaptation

### **4.3 Data Collection Methods and Analysis**

A multi-faceted approach is used to analyse the data. This includes thematic and content analysis to identify critical patterns within the collected information from verified sources. Insights from interviews on phone and digital communications undergo thematic analysis, enabling the identification of recurring themes and data categorisation. This process ultimately leads to recommendations for improved reporting practices, greater data accuracy, and enhanced overall sustainability performance.

### **4.4 Research Design for Quality and Reliability**

This dissertation prioritises research quality by employing a robust qualitative methodology. This is complemented by analysing relevant documents and regulatory frameworks to ensure a thorough understanding of the context. In-depth interviews with diverse stakeholders, such as shipping executives and industry experts, contribute rich, qualitative data that allows for a deeper exploration of the research question.

Data triangulation is used to strengthen the findings' validity and mitigates potential bias. This rigorous approach involves cross-referencing interview data with findings from the literature review, sustainability data from various organisations across different geographical regions, and regulatory analysis. By including organisations from diverse geographical locations, the study captures a broader range of perspectives and accounts for the contextual variations that may influence indirect emission practices within the Indian shipmanagement industry. Furthermore, the researchers' prior working experience in the marine industry is an additional strength, potentially contributing to a deeper understanding of the research topic.

### **4.5 Ethical Considerations**

This dissertation upheld ethical standards. Informed consent is obtained from all participants, clearly outlining the study's purpose, their right to withdraw, and data confidentiality measures. Participant anonymity is protected to maintain the confidentiality. Data storage and handling are adhered to relevant data protection

regulations. Findings are analysed and reported objectively, ensuring an accurate and unbiased representation of participant perspectives.

## **5. Findings and Recommendations**

This dissertation has examined the complexities of governing indirect emissions within the ship management sector, offering insights essential for navigating the evolving sustainability landscape. The findings presented in this section address the key research questions. Findings also explore the current state of indirect emissions governance within the industry, highlighting strengths, challenges, and areas for improvement. This analysis has resulted in recommendations for developing key insights, strategies, and best practices. These recommendations are tailored to address the specific needs and opportunities faced by ship management companies and allied industries in India striving to achieve sustainability goals while maintaining competitiveness in the global marketplace.

### **5.1 Case Study Analysis: A Path to Best Practices**

This analysis delves into the key elements of successful sustainability initiatives, offering a roadmap for effective replication across the shipmanagement industry. Understanding the factors that drive impactful change allows us to tailor strategies for broader success.

Several shipowners, particularly those based in the EU (including ship managers), demonstrate leadership in environmental governance. They have proactively implemented technical and data-driven strategies, conducted materiality analysis, and defined short-term (2030) and long-term (2040, 2050) net-zero targets with KPIs and interim plans. These companies often utilise the SBTi framework, invest in comprehensive sustainability training, employ external data verification, and actively engage their supply chains to achieve net-zero goals.

However, ship managers without direct ownership of vessels, especially in regions like Hong Kong, Singapore, and the EU, generally lack publicly available sustainability reports. Even when reports exist, insufficient data and no clear strategies exist for governing Scope 2 and 3 indirect emissions.

### **5.1.1 Barriers Hindering Adoption**

Analysis of diverse organisations reveals several factors hindering the adoption of proactive emissions strategies. State-controlled entities often lag in the proactive management of indirect emissions. This could be due to captive market size, financing models, and hierarchical structures that impede swift decision-making on non-immediate goals. This is observed in both Indian and Middle Eastern organisations. Ship managers face unique hurdles operating globally with clients with varying levels of commitment to emissions governance. Enforcing supply chain compliance becomes incredibly challenging in a cost-driven model. Since many technical ship managers are based in Hong Kong outside EU CSRD mandates, they might provide indirect emissions data only upon principal request, impacting data quality. Finally, significant regional disparity exists, with Europe leading progress. Much of the progress centres on Europe. India, primarily serving Japanese and Korean shipowners, likely needs more time for manning and crewing organisations to adopt standardised emission governance practices.

### **5.1.2 The Success Mindset: Proactivity, Vision, and Compliance**

To excel in indirect emissions governance, shipmanagement organisations must adopt a mindset of proactivity, long-term vision, and a commitment to compliance. Remaining actively informed about evolving regulations and market dynamics is essential for anticipating and adapting to change. Integrating sustainability principles into core strategic planning is crucial for long-term success. Finally, viewing compliance as an opportunity rather than a constraint is vital. Adhering to emissions standards can unlock growth potential, competitive advantages, and access to favourable financing options.

## **5.2 Theoretical Implications and Links**

The best practices identified in this study align with established theoretical concepts, including Mimetic Isomorphism, Legitimacy Theory, Stakeholder Theory, Resource Dependency Theory, and Institutional Entrepreneurship, as described in the abbreviations section. This study extends the application of these theories to the specific context of indirect emissions management within ship management.



Drawing on Institutional Theory, this study highlights how regulations like the EU's CSRD create coercive pressures, influencing sustainability practices even for companies outside its jurisdiction. Additionally, industry initiatives such as the Poseidon Principles and Sea Cargo Charter exemplify normative pressures shaping behaviours within the shipmanagement sector. However, mimetic isomorphism – imitating successful practices – is sometimes limited by resource and capability gaps, particularly among certain ship management companies. This underscores a need for research on bridging these gaps and promoting broader adoption of sustainability.

The Resource-Based View (RBV) suggests that firms can achieve competitive advantage through valuable, rare, inimitable, and non-substitutable resources. This study reveals the potential limitations of the RBV regarding indirect emissions management. Even some well-resourced Asian organisations (including large government bodies and state-owned shipowners) lack robust systems for this aspect of sustainability. While proactive investment in resources remains valuable, findings suggest that strategic choices, stakeholder influence, and the complexity of indirect emissions tracking may play equally influential roles.

### **5.3 Comparative analysis for managing Indirect emissions governance across the Shipmanagement sector Worldwide- Case Studies**

To navigate the complex landscape of indirect emissions governance, examining successful strategies employed by industry leaders is essential. This section offers a comparative analysis of case studies from shipowners who have demonstrated exemplary practices in managing Scope 2 and Scope 3 emissions. By dissecting their approaches, we highlight key strategies, common challenges, and best practices that can inform the development of effective governance frameworks across the wider shipmanagement sector.

**Case Analysis 1**, Company SN, a shipowner based in Europe, exemplifies a proactive approach to sustainability by aligning its efforts with the UN SDGs, conducting regular materiality assessments to prioritise key focus areas for each business unit, and conducting a manual review of the Materiality assessment for continual improvement. Within its

materiality assessment, Company SN has identified four broad areas of focus for ship management: Waste, Lifecycle Planning, Ocean Impact, and Emissions to Air.

The company has established a baseline to measure progress against its sustainability objectives with specific measurements of Scope 1,2 emissions (Table 3). Adopting the Sea Cargo Charter framework further aligns Company SN with global standards for transparent and accountable emissions reporting. This framework focuses on supply chain sustainability, ensuring that Company SN's efforts harmonise with global standards and practices for reducing environmental impact.

Indicator	2022	2021	Percentage Change
<b>GHG Emissions Scope 1</b>	1,531,884 MT	1,626,515 MT	5.8% less
<b>GHG Emissions Scope 2</b>	233, 892 MT	166,880 MT	40.1 % more

**Table 3:** *GHG Emissions YOY- Company SN*

Source: Organisations Annual Recorded Data

**Case Analysis 2,** Company Od, a shipowner and terminal owner based in Europe, demonstrates a commitment to sustainability reporting by utilising the SASB framework. Their efforts have yielded tangible results, including reducing Scope 2 emissions from 9,305 MT in 2021 to 8,877 MT in 2022 (Table 4). The company has also expanded its Scope 3 emissions reporting to encompass a broader range of upstream and downstream value chain emissions. This includes additional measurements in purchased goods and services (category 1) and Fuel-and-energy-related activities (category 3) using a spend-based approach. Former Scope 3 emissions reporting included Category 5 Waste Generated in Operations, category 6 Business Travel and Category 7 Employee Commuting. These actions align with the Paris Agreement and the IMO's net-zero strategy for 2050. Furthermore, Company Od promotes sustainable procurement by requesting CO2 reporting for purchased products and conducting ESG audits on suppliers – with 32% having undergone an on-site CSR audit.

Company Od reports CO emissions to the Carbon Disclosure Project (CDP), the source for metrics used for banks, in accordance with the Poseidon Principles.

Company Od uses a spend-based approach to measure the Scope 3 emissions category.

Indicator	2022	2021	Percentage Change
<b>GHG Emissions Scope 1</b>	1,279,741 metric tonnes	1,488,913 metric tonnes	14% less
<b>GHG Emissions Scope 2</b>	8,877 metric tonnes	9,035 metric tonnes	1.75 % more
<b>GHG Emissions Scope 3</b>	890,707 metrics tonnes		

**Table 4: GHG Emissions YOY- Company Od**

Source: Organisations Annual Recorded Data

**Case Analysis 3**, Company TO, a shipowner operating 70-80 oil tankers, employs a significant Indian workforce, with 40.6% (1306 individuals) of its 3218 seafarers being Indian. The company maintains a strong presence in India with its manning and technical offices. Committed to environmental responsibility, the company manages Scope 1, 2, and 3 emissions and utilises SASB reporting (Table 6). Since 2022, they have expanded to report Scope 3 emissions, following GHG protocols and identifying five key categories (Table 5). To improve data quality, the company aims to reduce reliance on secondary data by encouraging suppliers to provide primary/hybrid data. Additionally, Company TO has conducted climate-related scenario analysis using the TCFD framework, demonstrating proactive preparation for future challenges.

Emission Category		Data Source	Actions
Category 1	Purchased goods and services	Mainly secondary data. Lower data transparency	Improvement with engaging suppliers.
Category 2	Capital goods – vessels and modifications	88% of data is primary/hybrid data. 12 Percent is secondary data	A lightweight methodology cannot acquire the exact emissions data from the shipyards.
Category 3	Upstream fuel and energy-related activities	Primary/Hybrid data	With our drive to reduce our Scope 1 emissions by sailing more efficiently.
Category 6	Business travel, including seafarers travel	Primary/Hybrid data	Positioning of seafarers as efficiently as possible. Business communication towards online platforms
Category 13	Downstream leased assets – T/C out > 3 months	Primary/Hybrid data	Depending on the degree of operational control, these emissions fall in either Scope 1 (spot) or Scope 3 (time charter).

**Table 5: Emissions Category Identification- Company TO**

Source: Organisations Data

Indicator	Unit	2022	2021	2020
Greenhouse gas (G G) emissions				
Direct GHG emissions (Scope 1)	Tons CO <sub>2</sub> e	1,363,076	1,081,027	1,257,468
Indirect GHG emissions – owned (Scope 2)	Tons CO <sub>2</sub> e	448	486	434
Indirect GHG emissions – not owned (Scope 3)	Tons CO <sub>2</sub> e	607,961	1,238,479	Not calculated
Total GHG emissions	Tons CO <sub>2</sub> e e=equivalent	1,971,485	2,319,991	1,257,902

**Table 6:** GHG Emissions YOY- Company TO

Source: Organisations Annual Recorded Data

**Case Analysis 4,** Company MA, a major transportation and logistics company with over 100,000 employees (20% in India, 11% seafarers), is actively preparing for EU sustainability reporting standards (EU CSRD, ESRS). They have updated their double materiality assessment and created an ESG factbook for a standardised approach (Table 7). Recognising that 60% of their top clients have science-based emissions targets, Company MA understands the growing emphasis on Scope 3 decarbonisation. In 2023, they became the first shipping company with SBTi-validated 2030 and 2040 targets, aligning with 1.5°C and net-zero pathways (Table 8). To improve emissions calculations, they have shifted to activity-based methodologies for 82% of emissions tracking, minimising distortions caused by administrative costs and inflation. Further, Company MA demonstrates a commitment to sustainability throughout its supply chain by training 100 percent of staff in sustainable procurement.

Emission Category		Calculations
Category 1	Purchased goods and services	Reported based on financial data and includes operational goods.
Category 2	Capital goods – vessels and modifications	Based on life cycle assessments and reported capital expenditure.
Category 3	Upstream fuel and energy-related activities	Based on actual fuel procured and consumed.
Category 4	Upstream transportation and distribution	It is calculated using the Global Logistics Emissions Council (GLEC) methodology utilising transport data per transport category.
Category 5	Waste generated in operations	Reported based on amounts and types of waste
Category 6	Business travel, including seafarers travel	Reported based on our direct air travel activity and procurement data for other business travel-related activities.
Category 7	Employee commuting	Based on employee headcounts per location, estimated commuting distance and transportation modes.
Category 8	Upstream leased assets	Based on leased asset operations and not reported in scope 1 and 2.
Category 11	Use of sold products	Based on activity data for marine fuels traded by the Company to third parties

<b>Category 12</b>	End-of-life treatment of sold products	Based on activity data for end-of-life and retreatment of new and second-hand reefers sold,
<b>Category 13</b>	Downstream leased assets – T/C out > 3 months	Based on fuel consumption from vessels, tugs and planes leased to third parties
<b>Category 15</b>	Investments,	Calculated the extent of the equity share in non-controlled joint ventures and associates using financial data and corresponding factors

**Table 7: Materiality analysis - Company MA**  
Source: Organisations Data

2030-Aligned with 1.5-degree pathway			2040 – Net Zero
<b>Scope 1</b>	35% Reduction in the total scope one emission		96% Reduction in total scope 1 and 2 emissions
<b>Scope 2</b>	100% Renewable electricity sourcing		Info not available
<b>Scope 3</b>	22% Reduction in the total scope three emissions		90% Reduction in total scope three emissions

**Table 8: Intermediate Targets- Company MA**  
Source: Organisations Annual Recorded Data

**Case Analysis 5**, Company N, a Middle Eastern LNG owner and government entity, prioritises quality, environmental stewardship, safety, and security. This commitment is evident in their certifications (ISO 9001:2015, ISO 14001:2015, ISO 45001:2018, ISO 27001:2013, ISO 22301:2019) and membership in the British Safety Council. Since 2014, the company has publicly released annual ESG reports aligned with GRI standards. Technical measures have been implemented on their ships to enhance fuel efficiency. Scope 1 emissions and electricity consumption in corporate offices have been tracked since

2015. Company N has substantial technical investment plans to reduce Scope 1 emissions, upholding the Paris Agreement and the IMO's revised GHG strategy. KPMG assists with ESG preparation, and the company aligns with the IMO's revised greenhouse gas reduction strategy as per MEPC 80. While currently measuring Scope 1 emissions only, there are plans to map Scope 3 emissions by 2030 (Table 9). For Scope 2, the power company provides KWH hour consumption with a power bill.

Scope Greenhouse Gas (GHG) emissions	2020	2021	2022
Gross direct (Scope 1) GHG emissions (TCO2)	5,564,216	5,353,949	5,812,436
Scope 2 Total electricity consumption- kwh	71,795,517	79,030,635	84,331,584
Scope 3	None	None	None

**Table 9: GHG emissions YOY- Company N**  
Source: Organisations Annual Recorded Data

**Case Analysis 6:** Major Ship- Management Companies, including Company AS, Company WL, Company FL, and Company WL, are Hong Kong-based ship management companies; Company Ex, a Singapore-based ship management company; and Company IN, a Cyprus-based ship management company, have a significant crewing-manning office in India. No publicly available information exists on their approach to managing indirect emissions or sustainability governance practices. During interviews and discussions, it is noted that some companies have initiated significant efforts in managing Scope 2 emissions considering client's needs while others are still evaluating the options.

**Case Analysis 7,** COMPANY SI, an Indian shipowner, reports on energy efficiency measures related to Scope 1 emissions in their FY 2022-2023 BRSR reporting (Table 10). The company aligns with the IMO's revised 2023 GHG emissions strategy, which targets a 40% reduction in CO2 emissions per transport work by 2030 (compared to 2008 levels)



and a minimum 5% adoption of zero/near-zero emissions technologies. The goal is to peak international shipping GHG emissions and reach net zero by or around 2050. COMPANY SI's emission reduction action plans focus on Scope 1 emissions and do not cover any details on Scope 2 or 3 emissions.

Parameter	Unit	FY 2022-23 (Current FY)	FY 2021-22 (Previous FY)
Total Scope 1 emissions (Break-up of the GHG into CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs, SF <sub>6</sub> , NF <sub>3</sub> , if available)	Metric tonnes of CO <sub>2</sub> equivalent	9,27,191	9,11,294
Total Scope 2 emissions (Break-up of the GHG into CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs, SF <sub>6</sub> , NF <sub>3</sub> , if available)	Metric tonnes of CO <sub>2</sub> equivalent	NA	NA
Total Scope 1 and Scope 2 emissions per rupee of turnover	Metric tonnes of CO <sub>2</sub> equivalent per rupee of turnover	0.0000160	0.0000179
Total Scope 1 and Scope 2 emission intensity (optional) – the entity may select the relevant metric.	NA	NA	NA
<b>Scope 3 emissions data</b>	Not Published	Not Published	Not Published

**Table 10: GHG emissions YOY- Company SI**  
Source: Organisations Annual Recorded Data

**Case Analysis 8**, Company GS, a listed Indian shipowner, complies with BRSR reporting for FY 2022-2023 (Table 11), although the data has not been independently verified. Their report does not indicate alignment with SBTi targets. While the company supports the IMO's climate strategy (reducing CO<sub>2</sub> emissions per transport work by 40% by 2030 and total GHG emissions by 50% by 2050), its emission strategy needs to be aligned with the IMO's net-zero by 2050 target. Since 2014, their Vessel Performance Management department has implemented fuel efficiency measures, reducing GHG emissions, but their current focus remains solely on Scope 1 emissions.

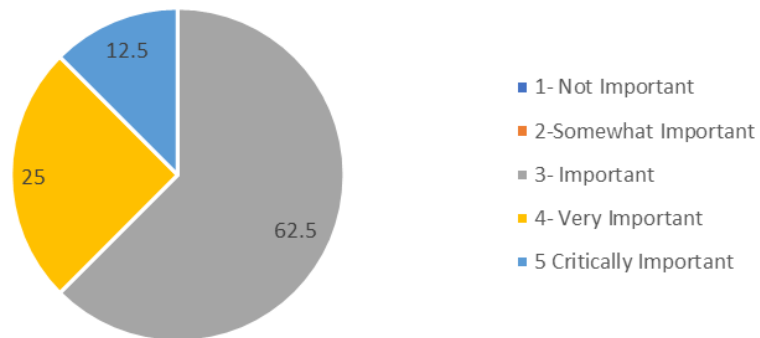
Parameter	Unit	FY 2022-23 (Current FY)	FY 2021-22 (Previous FY)
Total Scope 1 emissions (Break-up of the GHG into CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs, SF <sub>6</sub> , NF <sub>3</sub> , if available)	Metric tonnes of CO <sub>2</sub> equivalent	935657.522 MT	997655.78 MT
Total Scope 2 emissions (Break-up of the GHG into CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs, SF <sub>6</sub> , NF <sub>3</sub> , if available)	Metric tonnes of CO <sub>2</sub> equivalent	818.94 MT	569.39 MT
Total Scope 1 and Scope 2 emissions per rupee of turnover	Metric tonnes of CO <sub>2</sub> equivalent per rupee of turnover	193.69 MT/Cr	352.48 MT/Cr
Total Scope 1 and Scope 2 emission intensity (optional) – the entity may select the relevant metric.	NA	NA	NA
Scope 3 emissions data	Not Published	Not Published	Not Published

**Table 11: GHG emissions YOY- Company GS**  
Source: Organisations Annual Recorded Data

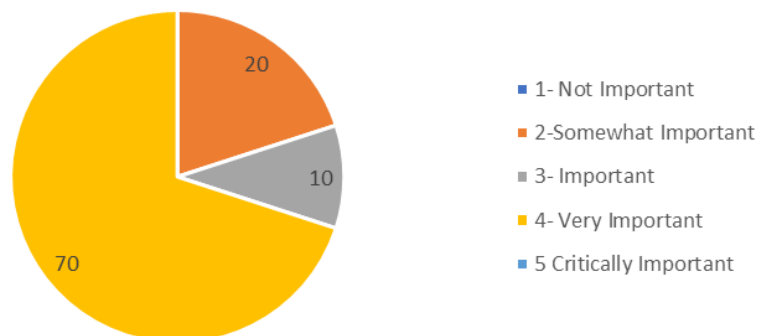
## 5.4 Interview Data

The main objective of collating interview data is to get an overview of how engaged employees are in Carbon Footprint reductions and the theories of organisational ownership across different geographies.

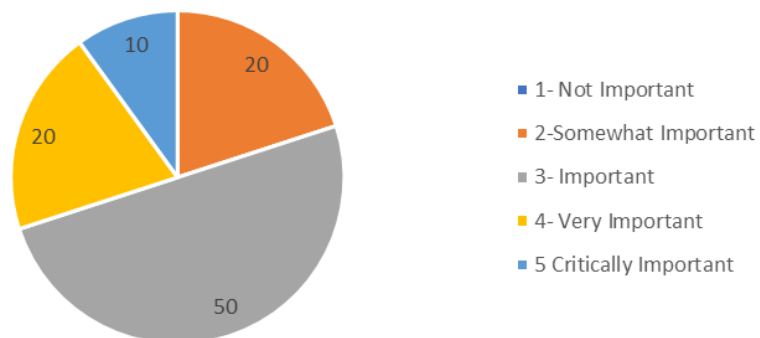
1. I am deeply concerned about the impacts of global warming.



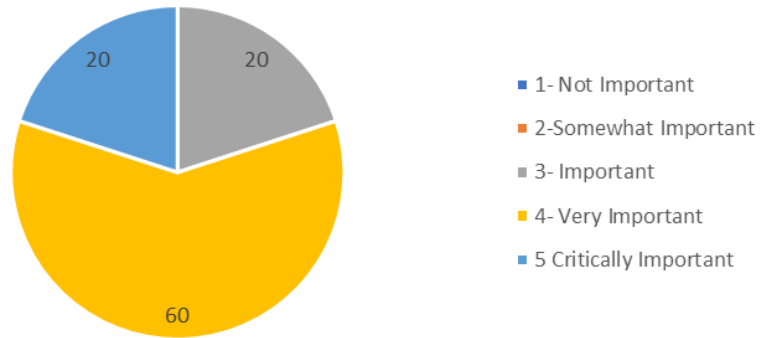
2 Shipmanagement Companies have a significant responsibility to address global warming.



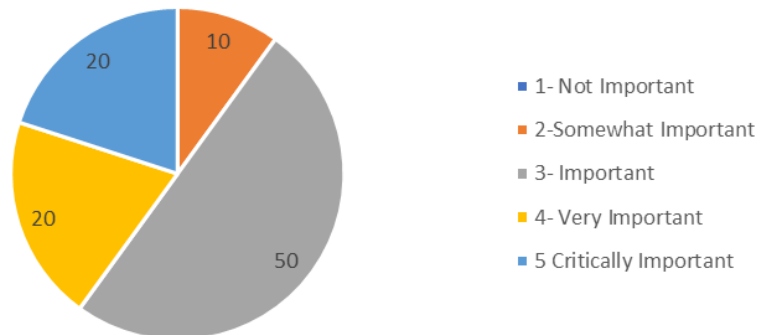
3. I am familiar with the IMO Net Zero GHG Strategy.



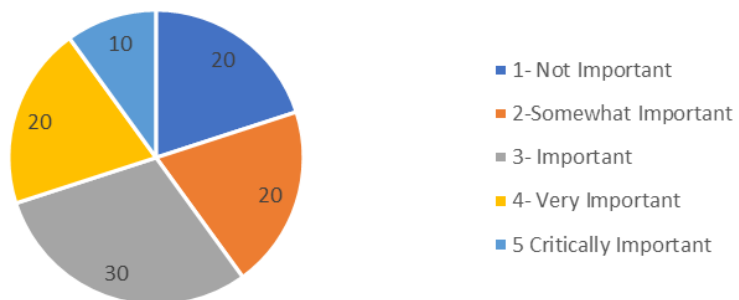
**4. I believe the IMO Net Zero GHG Strategy's targets are achievable.**



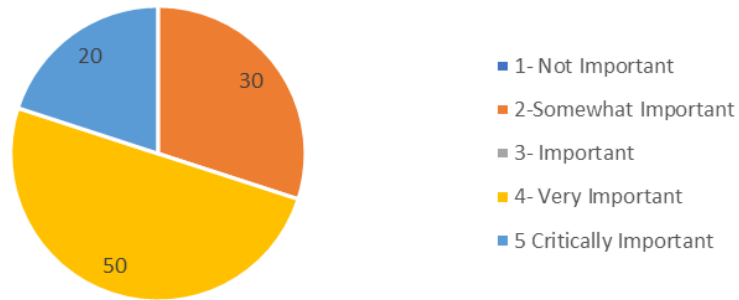
**5. I am aware of the SEBI BRSR regulations/ EU CSRD regulations.**



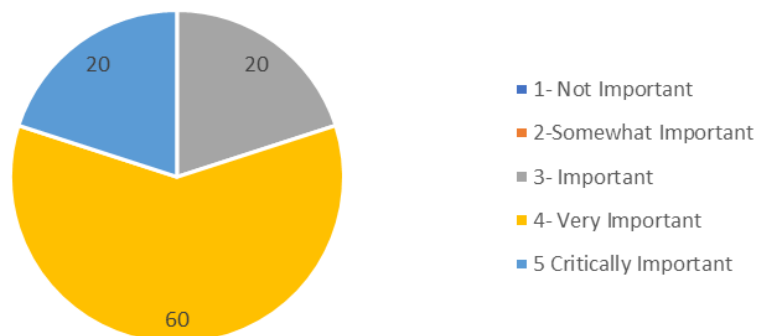
**6. I am aware of difference between Direct and indirect emissions. Vis a Vis Scope 1,2,3 emissions.**



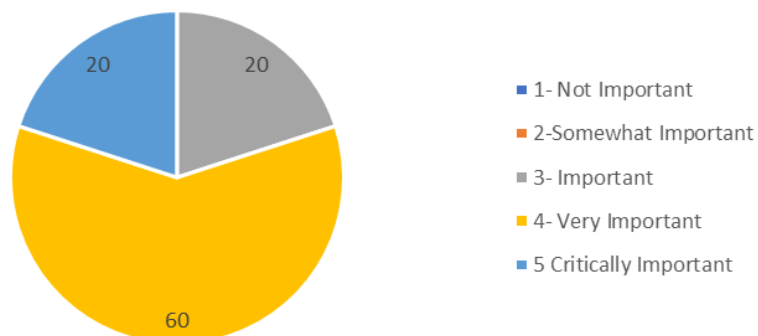
**7. The EU CSRD regulations are likely to influence my company's sustainability reporting, even if not directly applicable.**

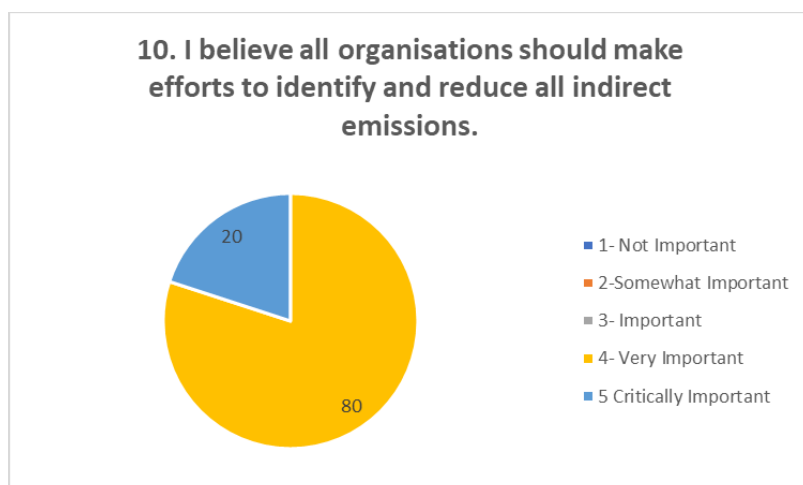


**8. Companies need to take immediate action to reduce their environmental impact**



**9. I believe my company's actions have a significant impact on the environment.**





The survey includes two yes-or-no questions to compare how Asian and European organisations approach a specific issue.



**Figure 9- Interview Data**  
Source: Interviews

## **5.5 Analysing the effectiveness of existing initiatives**

This section discusses qualitative research data from the literature review and stakeholder analysis-based research questions that answer key Research Question 1, i.e. The current governance frameworks to manage indirect emissions (Scope 2,3) and methodologies used by the Indian shipmanagement Industry vis a vis the needs of Global Counterparts.

India's Maritime Vision 2030 outlines ambitious growth targets for the sector, with 2020 as a benchmark. Key objectives directly linked to the effective governance of indirect emissions include increasing the global share of Indian seafarers to over 20%, significantly boosting renewable energy usage in ports to surpass 60%, and achieving a top 10 global ranking in shipbuilding and repair industries.

### **5.5.1 Indirect Emission Management in India**

Compared to the maritime and, specifically, ship management industries, non-maritime industries have taken the lead in good corporate governance of indirect emissions (Fig 10). While BRSR-SEBI regulations do not mandate Scope 3 emissions reporting, many Indian corporations voluntarily disclose their environmental impact in alignment with international practices. CDP data demonstrates this trend, with Scope 3 emissions reporting increasing significantly from 15% in 2020 to 41% in 2022 (CDP, 2022). This indicates a growing awareness of managing emissions throughout the value chain.

Company Name	Score
Infosys	A
JSW Steel	A
Hindustan Zinc	A
Mahindra Lifespace Developers Ltd	A
Wipro	A
ACC	A-
Dr Reddy's Laboratories	A-
ITC Limited	A-
JSW Energy	A-
Mindtree	A-
Shree Cement	A-
TATA Consultancy Services	A-
TATA Steel	A-
Tech Mahindra	A-
Ultratech Cement	A-
YES Bank	A-

**Figure 10. Climate Change Leaders**

Source: CDP, Decarbonizing India: Driving Climate Action Through Disclosure 2022

An analysis of the Indian port industry, excluding ship management, reveals that private companies with global experience and listed on domestic stock exchanges outperform government-run ports in reporting indirect emissions (Scope 2,3).

### **Ports- Services industry to ship management**

Major ports: None of the Major Port Authorities have Sustainability reports or emission governance measures in the public domain.

Private Port: Company AP, a prominent Indian corporation operating non-major ports, has its data independently assured by Ernst & Young. Their GHG reduction initiatives include switching to LED lighting, introducing electric vehicles, and automating processes for energy efficiency. Despite these efforts, the company has seen significant increases in plastic waste (300%) and e-waste (100%) over the past two years. Company AP has an ambitious roadmap to achieve carbon neutrality by 2025 and net-zero emissions afterwards. Strategies include reducing energy intensity by 50%, electrifying equipment, and aiming for 100% renewable energy by 2025 (with plans for 250MW capacity). The company tracks ESG metrics for its Tier 1 suppliers and provides support to improve their sustainability performance.



Parameter	Unit	FY 2022-23	FY 2021-22
Total Scope 1 emissions	Metric tonnes of CO2 equivalent	1,21,102	1,29,438
Total Scope 2 emissions	Metric tonnes of CO2 equivalent	2,61,951	1,93,063
Total Scope 1 and Scope 2 emissions per rupee of turnover	Metric tonnes of CO2 equivalent per rupee of turnover	17.10	17.8
Total Scope 1 and Scope 2 emission intensity (optional)	NA	NA	NA
Total Scope 3 emissions (Break-up of the GHG into CO2, CH4, N2O, HFCs, PFCs, SF6, NF3, if available)	Metric tonnes of CO2 equivalent	20,23,072	4,71,649

**Table 12: GHG emissions YOY- Company AP**  
Source: Organisations Annual Recorded Data

The ship management industry in India primarily has a dual role as both a core industry, with leaders like SCI and GESCO, and a service industry, employing seafarers for foreign owners and providing technical management from within the country.

The evolution of these diverse maritime sectors within India underscores the nation's potential to become a global leader in sustainable practices. By strategically integrating sustainability into shipmanagement operations, India can enhance its competitiveness while actively contributing to worldwide efforts to reduce the industry's environmental impact. Sustainability Policies in Indian Shipping

The governance of indirect emissions in ship management is increasingly acknowledged as crucial within the Indian maritime sector's sustainability policies. The Indian government and shipmanagement stakeholders actively develop strategies to address these emissions, underscoring a commitment to environmental stewardship. Key initiatives include integrating sustainable practices in the Maritime India Vision-2030, emphasising the

importance of reducing the sector's carbon footprint, including indirect emissions associated with port-led emissions (Maritime India Vision,2021). The vision document establishes an increase in the share of renewable energy to >60% across Major Ports. Additionally, projects like Sagarmala aim to enhance port infrastructure and connectivity and promote environmental sustainability through green practices, contributing indirectly to emission reduction efforts (Maritime India Vision,2021).

### **5.5.2 Emerging Sustainability Policies for Indirect Emissions in Indian Shipping**

The ship management industry increasingly focuses on managing indirect emissions through technological innovation, operational efficiency, and collaborative initiatives. From a global perspective, many companies remain primarily compliance-driven, adopting a reactive rather than proactive approach to sustainable practices. Indian companies are starting Scope 3 efforts, driven by customer and regulatory pressure in export markets. Business Today (2022) quotes Unni from McKinsey, “Scope 3 measurement, goals, and action plans to become the norm in the coming years”.

Within India, the shipmanagement sector's efforts to tackle indirect emissions often need to catch up to international practices due to infrastructure challenges, limited technological access, and a need for robust industry collaboration. While initiatives like Sagarmala, Maritime Vision 2030 and BRSR (Limited scope with listed companies only) signal a commitment to sustainability, the primary emphasis remains on direct impacts, with less focus on the broader scope of indirect emissions. Greater engagement with global sustainability frameworks and carbon trading mechanisms could significantly benefit Indian ship management companies and contribute to broader global decarbonisation efforts.

A fundamental shift is required to bridge the gap in proactive indirect emissions management globally and within India. This shift should prioritise innovation, partnerships, and strategic technology adoption. Aligning with established global best practices and fostering greater collaboration can significantly accelerate the shipmanagement industry's sustainability progress, especially within the Indian context

(Smith & Ramesh, 2018; Johansson et al., 2020; Kumar & Singh, 2020; Ministry of Ports, Shipping, and Waterways, 2021; Patel, 2019).

### **5.5.3 Inference**

Governance mechanisms for sustainability reporting in Indian ship management and allied industries are inconsistent due to a lack of mandatory provisions of governance. For example, BRSR is only focused on listed organisations. Scope 3 emissions are optional. This results in practices often falling below global standards and business expectations.

While all organisations comply with IMO requirements for Scope 1 emissions, only large listed ship-owning and ship-management businesses covered by BRSR address Scope 2 emissions. Major port authorities, exempt from BRSR and stock exchange listing, lack governance for indirect emissions tracking.

Large private ports in India publish Scope 2 and 3 emissions data with independent third-party assurance but not complete verification. Allied industries like technical and crewing management need more local governance mechanisms for Scope 2 and 3 emissions. Some crewing organisations contribute partial travel data to parent organisations for Scope 3 accounting.

Under BRSR, Scope 3 reporting remains optional, and guidelines exist without mandatory external data verification. This creates potential gaps for improvement. Further, a substantial portion of the ship management and allied service industry falls outside BRSR's scope due to company size, leading to an absence of formal governance structures.

## **5.6 Challenges in implementing governance frameworks**

This section discusses qualitative research data from the literature review and stakeholder analysis-based research questions that answer key Research Question 2, i.e., the gaps and challenges faced by Indian ship management and allied industries by aligning with global regulations and sustainability targets.

India is the third-largest emitter of CO<sub>2</sub> globally, accounting for 7.6% of worldwide emissions, trailing behind the United States (13.6%), China (30.7%), and the European

Union 17% (Tiseo, 2023). While India's per capita emissions remain lower at 16th (2021), technological disparities, financial constraints, a large population, rising energy demands, and fragmented regulatory frameworks complicate progress. These challenges are amplified for global organisations operating within India, which must align with international environmental goals while balancing the realities of a developing economy and potentially conflicting priorities of local stakeholders.

Specifically, Scope 2 emissions management presents hurdles, including evolving regulations, inaccurate or unavailable data, limited REC markets, slow grid decarbonisation, financial limitations, and a lack of widespread awareness.

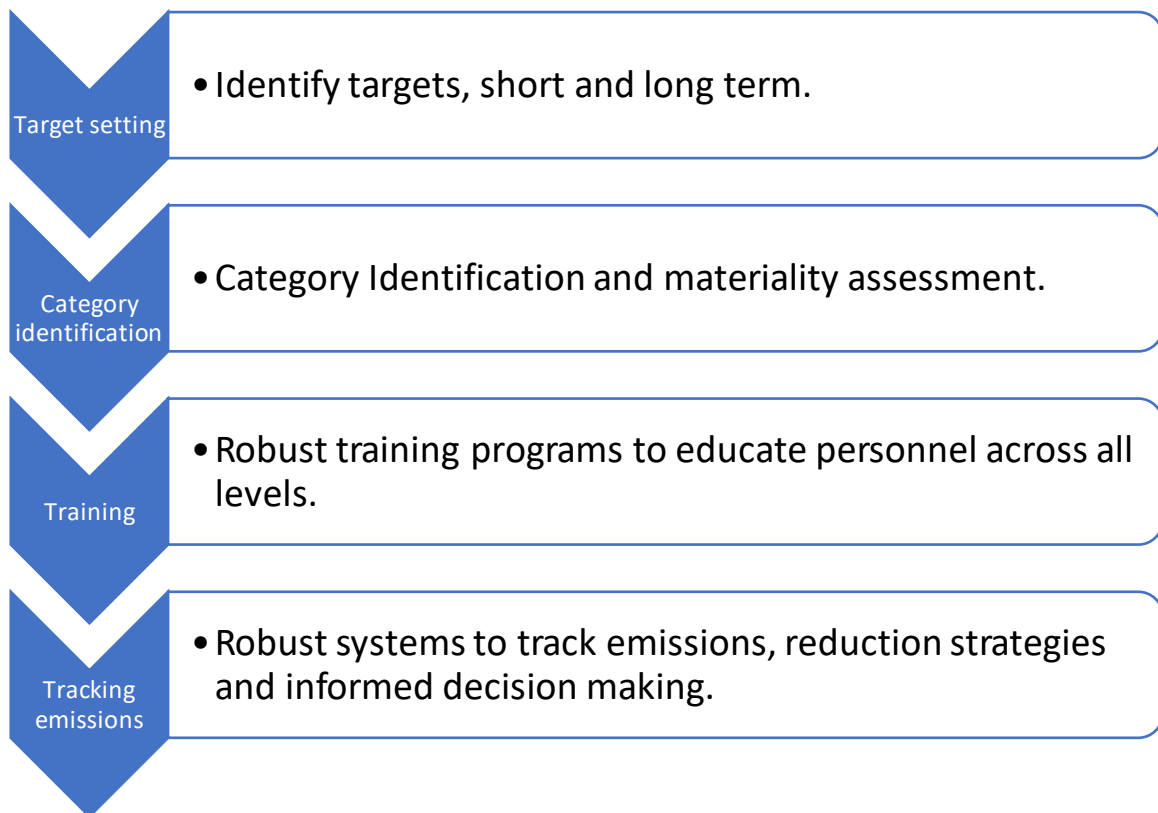
Scope 3 emissions, encompassing the entire value chain, add further complexity. These challenges range from mapping emissions sources across global operations to difficulties in data collection, a need for standardised methodologies, dependencies on third parties, technological barriers, financial implications, resistance to change, and regulatory uncertainty. With its inherently complex and international value chains, the shipmanagement industry highlights the urgency of concerted efforts in innovation, collaboration, and investment to address Scope 3 emissions effectively.

Companies face significant costs associated with monitoring, reporting, and reducing Scope 3 emissions. Securing funding and demonstrating a solid business case for sustainability initiatives remains a hurdle in a competitive industry. Additionally, some stakeholders resist additional reporting requirements, especially as it leads to perceived cost increases and competitive disadvantages. Finally, the need for clear international regulations specific to Scope 3 emissions in shipping creates uncertainty and hinders long-term planning.

## **5.7 Comprehensive Framework**

This section discusses qualitative research data from the literature review and stakeholder analysis-based research questions that answer key Research Question 3, i.e., the comprehensive framework that can guide Indian shipmanagement Companies for effective indirect emissions governance, ensuring compliance, enhancing sustainability, and fostering a competitive edge in the European Market.

To strengthen indirect emissions governance within the Indian shipmanagement industry, organisations should take the following actions: First, conduct comprehensive category identification and materiality assessments to map the most significant sources of indirect emissions, providing a data-driven roadmap for targeted reduction efforts. Next, invest in robust training programs to educate personnel across all levels on sustainability principles and best practices specific to emissions management. Additionally, it is crucial to develop robust systems for tracking emissions data and monitoring reduction strategies, as regular measurement enables informed decision-making and accountability (as mentioned in case analysis No. 4). Finally, organisations should transparently communicate progress on emissions governance with stakeholders. This builds trust, demonstrates a commitment to environmental responsibility, and attracts clients to prioritising sustainability.



*Figure 11: Comprehensive Framework to Manage Indirect Emissions*

Source: Researcher adaptation

## **5.8 Empowering Indian Ship Management: Practical Strategies for Indirect Emissions Governance**

This section examines qualitative research data gathered through a literature review and stakeholder interviews. This data addresses Research Question 4: How can Indian shipmanagement service providers leverage their capabilities, technology, and collaborations to assist Global and, more specifically, European partners with indirect emission targets while improving their market growth?

The following paragraphs (5.8.1, 5.8.2, 5.8.3, 5.8.4) discuss strategic actions that Indian shipmanagement service providers can consider to improve indirect emissions management and achieve the goals outlined in Research Question 4.

### **5.8.1 Foundational Actions**

To enhance indirect emissions management in the Indian shipmanagement industry, companies should prioritise the following foundational actions: First, establish measurable goals by setting science-based emissions reduction targets aligned with global net-zero ambitions and defining relevant Key Performance Indicators (KPIs) for tracking both Scope 2 and Scope 3 emissions. Next, conduct a comprehensive emissions inventory to identify the most significant indirect emissions sources throughout the value chain, including suppliers, shipyards, and ports. Prioritising high-impact areas creates a focused reduction strategy. Finally, implement robust data systems explicitly designed for efficient collection, analysis, and reporting of emissions data. Consider using standardised reporting platforms for enhanced transparency and industry-wide comparability.

### **5.8.2 Proactive Strategies:**

Shipmanagement and allied organisations should prioritise collaboration, innovation, and transparency to accelerate progress in indirect emissions governance. This includes forging close partnerships with suppliers to share emissions data, co-develop reduction initiatives, and explore sustainable fuel options. Additionally, explicit sustainability provisions in supply chain contracts can drive transformative change within the industry. Embracing

innovation through evaluating and adopting emerging technologies that optimise operations can directly reduce both Scope 2 and Scope 3 emissions. Finally, demonstrating transparency by regularly disclosing emissions data and progress reports builds trust with stakeholders. Participation in industry benchmarking initiatives can further facilitate comparison and continuous improvement within the sector.

### **5.8.3 Internal Transformation:**

Effective indirect emissions governance necessitates a fundamental internal shift within shipmanagement organisations. This transformation hinges on prioritising sustainability leadership through a clear commitment from senior management and integrating sustainability objectives throughout core business strategies. Equally important is empowering employees by providing comprehensive training on emissions accounting, data management, and sustainable practices. Finally, aligning performance incentives and recognition with achieving sustainability goals reinforces desired behaviours and fosters a culture focused on continuous emissions reduction efforts.

### **5.8.4 Critical Considerations**

Effective indirect emissions governance in the shipmanagement industry requires addressing these critical factors:

**Capacity Building for Smaller Operators:** To support smaller ship management companies, providing targeted resources and training is essential. This should focus on helping them identify emissions hotspots within their operations, develop achievable emissions reduction plans that align with industry best practices, and understand how to access potential financial support for sustainability upgrades.

**Robust Data Management Systems:** Establish standardised data collection protocols for supply chain emissions. Implement data management systems that ensure data accuracy, transparency, and compatibility across industry platforms.

**Collaboration and Incentivization:** Promote industry-wide knowledge sharing through workshops and seminars. Collaboratively develop regulatory frameworks that reward early adopters of sustainable practices with apparent emissions reduction and reporting metrics.

### **5.8.5 Policy Recommendations: Building a Robust Framework**

To build a robust framework for managing indirect emissions, India should consider these policy actions:

**Mandate Comprehensive Reporting:** Expand the BRSR to require Scope 3 emissions reporting, initially for larger listed companies. This expansion would enhance transparency, drive accountability across value chains, and align with the growing emphasis on indirect emissions in global sustainability reporting.

**Foster Global Alignment:** Actively engage in international forums to harmonise India's regulations with emerging best practices like the CSRD and Poseidon Principles. This simplifies compliance for global Indian companies and enhances the nation's sustainability leadership.

**Incentivize Collaboration:** Implement policies that promote collaborative emissions reduction projects between ship management companies, fuel suppliers, and technology providers. Support can include tax breaks, co-funding schemes, and knowledge-sharing platforms to accelerate innovation.

**Empower Smaller Organizations:** Offer targeted support programs tailored to smaller ship management companies' unique needs. Provide technical assistance, accessible data tools, and financial support mechanisms to ensure inclusive progress within the industry.

**Establish a National Decarbonization Roadmap:** Establish a clear, long-term national roadmap for decarbonising the shipmanagement sector. Include well-defined interim targets to give businesses predictable direction and encourage proactive investment in sustainable strategies.

### **5.8.6 The Path Forward: A Robust Framework for Indirect Emissions Governance in the Indian Ship Management Sector**

India needs a comprehensive governance framework tailored to its unique maritime landscape to manage indirect emissions effectively. Key elements of this framework should include:



**Standardised Methodology:** Adopt a transparent, standardised emissions accounting methodology aligned with international best practices (such as the GHG Protocol), including adaptations specific to India's shipmanagement industry. Provide detailed guidance on data collection across all relevant Scope 3 categories for ship management companies.

**Tiered Reporting:** Implement a tiered reporting system that prioritises emissions "hotspots" within Scope 3 for larger companies, with a phased approach for smaller organisations. Such reporting will help to monitor and systematically evaluate what control measures are required to be taken like technical innovations, organisation's consumption control etc. This ensures practicality and fosters industry-wide inclusion.

**Capacity-Building Hub:** Establish a centralised platform to address knowledge and resource gaps. Provide practical tools, templates, tailored training programs, and Indian case studies exemplifying successful emissions reduction strategies. Training subjects relate to primary roles and designations within an organisation, including, but not limited to, Introduction to Carbon Footprints, Sustainability Frameworks and Goals, Personal Actions for Impact, Management and Leadership, Reporting, and Data Analysis.

**Incentivising Collaboration:** Create formal mechanisms to reward collaborative initiatives. These could include public recognition for sustainability leaders and targeted funding for joint emissions reduction projects between ship management companies, ports, fuel suppliers, and research institutions.

## **5.9 Potential for New Insights**

The complexities surrounding indirect emissions management within the shipmanagement industry necessitate innovative solutions. Exploring the potential of carbon credits offers a promising avenue for Indian shipmanagement companies to accelerate their transition towards net-zero emissions. Future research should explore the strategic potential of carbon credits for service providers and regulatory bodies in reducing indirect emissions. In the future, a vital focus of this research would be to analyse the suitability of different carbon credit generation projects (such as those focusing on renewable energy, afforestation, carbon capture and storage, and methane capture) within the unique Indian

shipmanagement industry landscape. Additionally, evaluating the potential challenges and opportunities associated with implementing carbon credit systems within the Indian shipping industry is crucial. This analysis would provide valuable insights for policymakers, industry leaders, and sustainability practitioners working towards net-zero goals.

## 6. Conclusion

Each organisation studied as part of the dissertation employs its own methodology to identify and achieve its goals.

### 6.1 Summary of Key Findings:

This research reveals several key findings regarding indirect emissions governance within the Indian shipmanagement industry:

**Indian Shipmanagement Industry:** Inconsistent reporting and significant gaps exist in Scope 2 and 3 emissions governance. Scope 3 emissions remain largely unmapped, while Scope 2 governance is improving but needs to be more balanced, particularly within public sector organisations. Listed companies demonstrate the most vital compliance trends.

**International Comparison:** While government-owned Indian shipowners exhibit similar Scope 1 compliance as their Middle Eastern counterparts, they lag in transparent reporting practices. European shipowners lead overall compliance across Scopes 1-3 and demonstrate well-established sustainability initiatives.

### 6.2 Contributions to Knowledge

**Academic Contributions:** This study advances knowledge in several areas. It demonstrates how evolving regulations like the CSRD create coercive pressures, influencing organisational change toward sustainability reporting practices. Furthermore, it highlights resource and knowledge gaps as critical barriers to effective emissions governance, particularly for smaller companies. Finally, the study emphasises the evolving nature of sustainability reporting and the increasing importance of stakeholders in driving responsible practices throughout global supply chains.

**Practical Contributions:** This study offers valuable practical insights for businesses. First, it guides understanding and addressing the compliance challenges posed by the CSRD, suggesting potential solutions (mentioned in previous sections 5.7, 5.8). Additionally, it highlights capacity building and knowledge sharing as vital for improving sustainability

practices across the shipmanagement industry. Finally, it provides a roadmap for businesses to successfully navigate the CSRD, enhance their sustainability reporting, and ultimately strengthen their legitimacy and competitiveness in the evolving market landscape.

### **6.3 Limitations of Research**

**Scope:** The study's primary focus is on companies newly impacted by the CSRD, specifically those engaged in outsourced ship management services to global organisations. It does not explore regulatory impacts deeper within these companies' supply chains. The study has also not verified if the use of alternative fuel can reduce the S2E and S3E emissions. Additionally, it is essential to recognise that findings may vary based on a company's specific operational context.

**Methodology:** The reliance on interview-based data could introduce potential biases, such as the possibility of interviewees intentionally withholding information or presenting an overly optimistic image of their organisation. To mitigate this, efforts were made to achieve data saturation and carefully select interviewees to ensure diverse perspectives.

**Evolving Regulation:** The CSRD remains under development. Therefore, findings reflect the regulatory landscape as of December 2023. Challenges and solutions may shift as CSRD standards are finalised and implemented.

### **6.4 Directions for Future Research**

This study highlights several promising avenues for future research:

**Expanding Industry Focus:** Investigate how core maritime industries, such as ports, shipbuilding, and dry docks, can leverage indirect emissions measurement and reporting to attract responsible shipowners, potentially enhancing their competitiveness.

**Supplier Perspective:** Examine the challenges suppliers and transportation providers face in adapting to CSRD requirements, particularly within the cargo shipping sector. Identify strategies these stakeholders employ for successful compliance.

**Sector-Specific Impacts:** Conduct comparative studies to analyse how CSRD impacts various industries differently. Develop tailored recommendations for effective implementation across different sectors.

**Longitudinal Analysis:** Track the implementation and ongoing adaptation to the CSRD. This provides insights into evolving strategies, challenges, and effectiveness.

**Quantitative Exploration:** Supplement qualitative findings with quantitative research and statistical analysis. Explore the CSRD's impact on specific sustainability KPIs and financial performance metrics.

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