

Beyond Climate Change: A Model of Sustainable Development for the Maritime Industry

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ABSTRACT

Recent discussions on sustainable development in the maritime industry have focused on climate change, emissions reduction, and future fuels. While vital for global trade and climate management, these topics are only part of the broader sustainable development agenda. The United Nations Sustainable Development Goals (UN SDGs) highlight the need to expand this conversation.

Through a series of interviews, this study aims to develop a sustainable development model tailored to the maritime industry. Defining the maritime industry, and contextualising sustainable development to the sector provides significant challenges. The industry's diversity complicates any definition as it encompasses shipping, maritime services, shipbuilding, education, equipment manufacture, offshore supply, recreational boating, fisheries, coastal tourism, marine mining, and offshore energy.

The results show a model that can be applied to the industry in order to address key sustainable development challenges. Key areas that can be incorporated into business strategy have been identified and explained.

Keywords:

Sustainable Business Model; Maritime Business; Social Sustainability; Environmental Sustainability; Responsible Management

INTRODUCTION

In recent years discussion of sustainable development within the maritime industry has tended to focus on

topics relating to climate change, minimising emissions, and the development of future fuels. However, whilst critical to the future of global trade and to managing climate change, these form only one part of the wider sustainable development agenda. A cursory glance at the seventeen United Nations Sustainable Development Goals (UN SDGs) highlights the need to widen the debate.

This study aims to develop of model of sustainable development that is appropriate for the maritime industry. Within that (relatively) straightforward aim lie a number of challenges:

- what does sustainable development mean for the maritime industry?
- what constitutes the 'maritime industry'?
- what is the purpose of the model?

Sustainable development can be characterised by the UN SDGs, but even using that as a framework, sustainable development can mean different things to different people, as well as being both an ongoing process and as a goal in its own right.

Alongside this, defining the maritime industry can be challenging, particularly as "*Maritime business is exceptional, diverse, and peculiar*" [1]. Clearly shipping, maritime business services and shipbuilding/repair are core aspects of the industry, but the maritime industry is broader. It includes education and training; equipment manufacture and repair; offshore supply; recreational boating; fisheries and aquaculture; coastal/marine tourism; marine minerals mining; and offshore energy. For the purposes of this research, the term 'maritime

industry' is used to represent all of the aspects.

Turning to the purpose of the sustainable development model, one has to consider the overall aim of business models; Osterwalder & Pigneur relate business models as describing how an organisation “creates, delivers, and captures value [2].” Recent years have seen a growing link between business models and sustainable development as a result of the latter taking on greater corporate significance. Sustainable business models must therefore enable organisations to understand their value proposition, along with focus on new ways of working, infrastructure development and growth across environmental and social aspects.

DEFINING SUSTAINABLE DEVELOPMENT

Sustainable development emerged to address global environmental and social concerns, encapsulated in the ‘Brundtland Report’ as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [4]. This concept has historical roots, with early examples of resource protection dating back to the 17th century, highlighting longstanding concerns about sustainable resource use.

Sustainable development encompasses various definitions but generally involves the interplay between environmental issues, socio-economic problems, and the need for a sustainable future. It is viewed as both an evolving process and an ultimate goal. Reference [5] (2003) proposed a taxonomy to mitigate ambiguities in defining sustainable development, categorising goals into aspects to be sustained (e.g., nature, biodiversity, ecosystems) and aspects to be developed (e.g., people, economy, community, society).

Although historically the notion that businesses exist solely for profit, as argued by Reference [6], this has been challenged, with recent perspectives recognising that business viability depends on healthy ecosystems and

stable societies. For this study, the Brundtland Report's definition of sustainable development is adopted.

The Triple Bottom Line

Sustainable development extends beyond economic considerations, incorporating social and environmental dimensions. The Triple Bottom Line (TBL), popularised by [7], frames these dimensions as interconnected pillars essential for sustainable development. This approach argues that a company's success is measured not just by economic strength but also by social and environmental performance.

The TBL serves as both a tool for improving organisational functions and a reporting mechanism, providing early warnings to react to stakeholder changes and mitigate impacts. This framework suggests that development goals must be socially focused, respect environmental conditions, and be economically feasible [8].

Economic Sustainability

Economic sustainability is defined as the optimal management of resources to achieve stable growth. It involves maintaining economic growth, increasing customer numbers, fostering innovation, and supporting social and environmental issues. This requires considering financial performance, strategic planning, and innovative practices to ensure long-term viability.

Environmental Sustainability

Environmental sustainability focuses on maintaining natural capital, which includes both critical and renewable resources. This involves ensuring that resource use meets current and future needs without compromising ecosystem health. Organisations must use environmental knowledge to inform decisions, minimise waste, and manage operations within an environmental management system.

Social Sustainability

Social sustainability encompasses aspects like social capital, cohesion, inclusion, and community engagement. It involves ensuring equitable access to services, intergenerational equity, community ownership, and political participation. Organisations must consider skills development, stakeholder engagement, and community participation to achieve social sustainability.

Sustainable Business Models

Business models articulate how firms deliver value to customers through interrelated functions and external relationships. These models have evolved to incorporate sustainable development, reflecting changes in business practices and organisational goals. Sustainable business models integrate value propositions, financial models, customer interfaces, and business infrastructure, emphasising long-term focus, resource sharing, and stakeholder engagement.

Interest in linking business models with corporate sustainable development has grown, recognising sustainable development as a strategic goal that requires structural and cultural changes within organisations. External drivers like legal changes and customer pressure, alongside internal drivers like personal beliefs and efficiency needs, drive the pursuit of sustainable business models.

Sustainable Maritime Business Models

The maritime industry has limited literature on sustainable business models, often focusing on specific outcomes rather than holistic approaches. However, some studies examine port sustainable development, proposing frameworks for managing environmental impacts and developing sustainable practices.

Reference [9] developed a Port Sustainability Management System for smaller ports, aligning with the value proposition, customer interface, and business infrastructure aspects of sustainable business models.

Although financial modelling is less represented, the system's focus on asset longevity and maintenance provides a base model adaptable to wider maritime contexts.

Fig 1 shows the *a priori* themes developed from the literature; these themes formed the basis of the interviews which sought to confirm and expand themes for the final model.

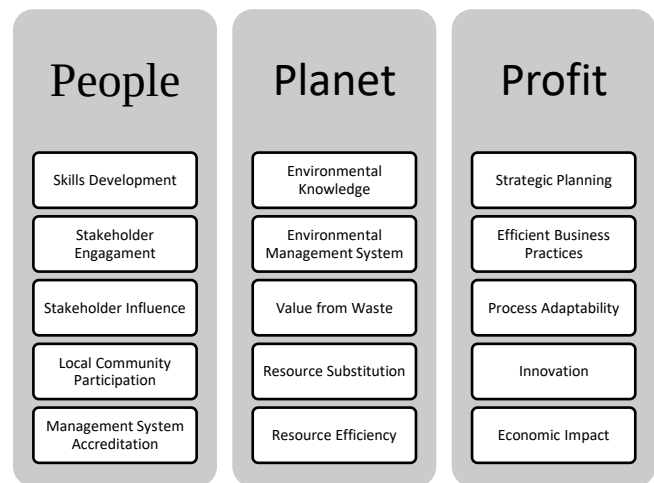


Figure 1 *a priori* Themes of Sustainable Development
Source [3]

In summary, sustainable development integrates economic, environmental, and social dimensions, with business models evolving to reflect these goals. The maritime industry, particularly ports, demonstrates specific sustainable development needs that can inform broader applications. Sustainable business practices ensure long-term viability by balancing profitability with environmental stewardship and social responsibility.

METHODOLOGY

Interview subjects were selected from those deemed to be involved or have an interest in sustainable development within organisations across the maritime industry in the UK.

Table 1 shows the list of participants.

Table 1 List of Interview Participants

Interviewee	Position	Sector
A	Harbour Master	Port Authority
B	Sales Manager	Engineering
C	Head of Marine Operations	Shipping & Engineering
D	Director	Education
E	Chief Executive	Maritime Business Services
F	Director	Maritime Business Services
G	Partner	Maritime Legal Services
H	Owner	Shipowner
I	Senior Business Developer	Cultural Organisation
J	Chief Executive	Cluster Practitioner
K	Legal Director	Maritime Legal Services
L	Chief Executive	Cluster Practitioner

Source [3]

Thematic Analysis enables the analysis of different types of data, varying sizes of datasets and the production of theory-driven analyses [10]. This is of particular importance given the need in this study to synthesise literature and interview data to produce a theory-driven sustainable business model appropriate for the diverse nature of the maritime sector.

Template Analysis as a Form of Thematic Analysis

As a form of Thematic Analysis, Template Analysis has been used extensively in business, management and organisational research [11] [12] [13]. Reference [14] identifies two key advantages of using template analysis; it can be particularly flexible to meet the needs of the research, and it is argued to work well in research examining the views of differing groups in an organisational context. Template Analysis is regarded as a flexible approach that can be used across a range of philosophical positions within qualitative research [13]. As a result, there is no one prescriptive method, although

there are general principles; these steps, based on [15] [13] [16] were followed:

Stage 1: Develop *a priori* Themes.

a priori codes, based on established literature, range from 'hard' to 'soft' themes (King and Brooks, 2017). 'Hard' themes are clearly defined, while 'soft' themes are potential areas of interest. This study focuses on 'harder' themes. Two considerations in using *a priori* themes are to remain open to new themes and to adjust or discard predetermined ones if needed, to maintain research validity [15] [17].

Stage 2: Data Familiarisation

This stage aims to immerse the researcher in the data through repeated reading and listening; it goes beyond data familiarisation, involving more analytical and critical reading [18]. While some analysis occurs, it is less formal and precise than later stages, and outcomes from this stage were not solely relied upon.

Stage 3: Preliminary Coding

This stage involves identifying data relevant to the study's aims, objectives, and research questions, similar to most thematic analysis methods [17]. The coding process starts with 'complete coding,' identifying anything of interest [18]. Potential themes, alongside *a priori* themes, are identified at this stage.

Stage 4: Define Initial Coding Template

This stage focuses on identifying and reporting patterns in the data, with emphasis on the meaning of patterns rather than their frequency. Saliency analysis, introduced by [19] and discussed by [18], emphasises the importance of infrequent items. Unlike other thematic analysis methods, template analysis often uses a data subset for initial coding [17]. However, this study used the entire data set for preliminary coding, enhancing validity by ensuring no emergent themes were overlooked and allowing for template modifications.

This study employed hierarchical coding to develop the initial coding template. This process groups similar codes into higher-order themes, typical of template analysis [17]. Hierarchical coding aligned well with using *a priori* themes, which were organised as top-level and sub-level themes.

Stage 5: Applying and Developing the Template

This stage typically applies the initial template to new material. Since the entire data set was used to develop the initial template, the template was reapplied to the same data with a different perspective. This iteration confirmed the template, ensured inclusion of relevant material, and verified the relevance of previously included material.

Stage 6: Finalise Template

Reference [17] identify three aspects of final interpretation and presentation: examining theme patterns, prioritising themes, and exploring connections. Analysing patterns can offer insights and justify further examination. Listing and summarising findings are crucial, particularly in this research, as the qualitative phase justified the themes in the quantitative survey. Understanding theme connections can lead to revising theoretical models, which is significant for the development of the quantitative phase.

FINDINGS

A comprehensive literature review enabled the development of core *a priori* themes as required by the Template Analysis approach. Interview topics were based around these themes with the aim of confirming, revising or removing them.

Perceptions of Sustainable Development

Each interviewee was asked to give their perception of sustainable development. There was consensus that sustainable development should be viewed as growth that does not deplete or destroy the resources or environment needed to sustain itself, although others acknowledged that sustainable development may mean different things

to different people.

Many of the responses focused on the long-term survival and growth of the organisation, for example “ports that aren’t sustainable wither and die” (Interviewee A). Sustainable development was described as the ability to operate within one’s financial means, ensuring that income and expenditure are balanced with a small surplus. Environmental concerns were included, with emphasis on approaches being environmentally conscientious, aiming to generate surplus funds that can be invested in long-term infrastructure and maintenance for the benefit of both current and future stakeholders. The long-term view was further reinforced. It should not be viewed as a short-term, profit-driven venture but rather one that ensures longevity, integrating environmental and social responsibilities for long-term benefits.

It was argued that in a business context, sustainable development encompasses the wellbeing of staff, the environment, and the positive impact of their products both locally and internationally. Sustainable development was linked to maintaining good client relationships and ensuring client satisfaction. Furthermore, sustainable development was closely associated with trust, emphasising the importance of long-term relationships and partnerships. Sustainable development is about ongoing collaboration and mutual trust rather than one-off transactions.

The social aspect of sustainable development was highlighted by some interviewees: “...it means wellbeing of staff...” (B); “...responsible development as well as the social aspects...” (G), with a particular focus on skills from J: “...the big challenge for the maritime sector is skills...”

The discussions continued by examining the pillars of sustainable development that form part of the Triple Bottom Line proposed by [7]. For this study, these pillars

were referred to as the profit, people, and planet dimensions of sustainable development.

Profit

Issues around profitability and long-term economic viability dominated the initial discussions on sustainable development; “any business that is not profitable is not sustainable” (C) and efforts must “be economic at the end of the day” (F).

Whilst those issues were the most significant, there was discussion of how to embed sustainable development in to strategic planning, and the need for innovation to support business growth.

People

The people, or social dimension of sustainable development refers to the impact organisations have on their employees, workers throughout their supply and value chains, customers, stakeholders, and the communities in which they operate [20]. Among the interviewees, the people aspect of sustainable development was seen as crucial: “you need the right people. You need the right skills. You need the right experience. You need to keep the experience which exists in the UK going” (E).

The broader training role of firms was discussed: “the training and skills issues are self-evident because of the way they’ve built their own training school... and there’s a real engagement between skills gaps and employer-led training” (F); with retaining knowledge in the region being important “because it creates a maritime centre of excellence and if a sustainable maritime centre of excellence is established then the benefits for the whole region are enormous” (G).

While the people dimension was dominant, there was some discussion about maintaining the customer base and staying relevant to customer needs (A); supporting the community in which they operate (C); and supporting

local educational providers (K).

Planet

Of the three pillars, the planet pillar was the least developed. This may be partly due to the types of businesses the interviewees represented, where environmental issues were considered less pertinent. Knowledge played an important role in one interviewee’s experience, where the firm was involved in the “sustainable development of the Arctic; putting regulations in place that will make it safer for seafarers, protect the indigenous community and help prevent pollution” (G).

Some highlighted the importance of environmental issues: “...it’s done with due regard to the environment...” (A); and that it “...doesn’t destroy the resources or environment that it requires to sustain itself...” (E). E emphasised the environmental aspect of sustainable development further: “It is an environmental terminology” and viewed the application of sustainable development in the maritime business services sector with some reservation: “I don’t think sustainable development’s a useful term in this context... you know, I mean, you know these are service businesses... they don’t destroy resources that they need. I mean it just doesn’t work like that” (E).

In summary, perceptions of sustainable development demonstrated the importance of sustaining and developing the business as a central tenet of sustainable development. Other related activities were generally seen as secondary to, or supportive of, staying in business. Table 2 summarises the key findings from the interviews.

Table 2 Summary of Data Analysis

Theme	Sub-theme	Key Findings
People	Skills Development	Skills are critical Staff development and engagement with educational institutions Long-term issue
	Stakeholder Engagement	Engagement with wider region Provide benefit to stakeholders Stakeholder involvement in development issues
	Stakeholder Influence	Increasing awareness of industry issues Promoting the maritime industry Providing benefit
	Local Community Participation	Contributing to region Engagement with educational institutions Engaging with local community
	Management System Accreditation	Open dialogue through relationships Takes into account different factors Long-term view of business development
	Environmental Knowledge	Operations take environmental considerations into account Exercising diligence in decision-making Collaboration to develop knowledge
Planet	Environmental Management System	Operating in a conscientious way Informing decision-making Formal recognition not significantly important
	Value from Waste	New ways to use waste by-products Collaboration to solve common problems Proximity important to achieve this
	Resource Substitution	Developing renewable energy sources through collaboration Knowledge creation and diffusion to meet challenges Lower recognition in business service firms
	Resource Efficiency	Sharing assets Integration of systems Lower recognition in business service firms

Theme	Sub-theme	Key Findings
Profit	Strategic Planning	Sustainable development in business plan Key part of sustainable development Meeting future needs
	Efficient Business Practices	Sharing best practice Closer integration Contributes to new ways of working
	Process Adaptability	Ability to meet changing regulations
	Innovation	Significant challenge to the maritime industry Link to academic and R&D institutions Environmental focus
	Economic Impact	Remaining in business Contribution to region through wages, taxation and indirect spend Financial management critical to sustainable development

Source: [3]

CONCLUSION

Whilst decarbonisation and climate change have dominated much of the discussion around sustainable development across the maritime sector in recent years, the sustainable development agenda is much more extensive. With sustainable development meaning different things to different people at different times, firms can find meaningful engagement with the topic difficult. Implementing a sustainable business model, focusing on the people, planet and profit pillars of sustainable development can provide a useful tool for maritime firms to develop their sustainable development strategies.

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