STIMULATE AND SUPPORT **SUSTAINABLE BEHAVIOUR** WITHIN PROJECT SCOPE

A gamification based intervention towards sustainable behaviour within project scope in a marine contracting organization

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MARINE CONTRACTORS

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The sustainability challenge: How to stimulate and support sustainable behaviour in a marine contracting organization?

A gamification based intervention towards sustainable behaviour within project scope in a marine contracting organization

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A.C.M. Schreuder
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EXECUTIVE SUMMARY

Over the years, the marine contracting sector has faced many challenges surrounding safety, the economic fluctuations because of the oil crisis and now tackling the sustainability challenge. Years of experience in the offshore industry, a heavy industry that contributes significantly to the climate crisis through its environmental impact, is deemed to change its strategy and way of working. However, this challenge is relatively new and asks for a new approach to move along with the fast-changing requirements of clients and external regulations that can have financial consequences if one is not acting now. Engineering solutions to reduce and prevent impact are already aligned, thinking of shore power, carbon capture and storage techniques, and alternative fuels on the vessels. Nevertheless, the total environmental impact goes beyond the implementation of these technologies. Making a change on the total impact of a marine contractor asks for a behavioural change within the organization, towards decision-making taking care of the environment. Finding a balance in actions that lead to investing in sustainable technologies and setting every employee to actions that flourish within to contribute to the company's sustainability ambitions will help improve their environmental performance.

This research focuses on the challenge of addressing sustainability within the organization by exploring how sustainable behaviour can be stimulated and supported. Literature is collected on how organizations can influence their employees' behaviour, what structural elements are essential to managing sustainability successfully, and what environmental indicators must be considered. From those insights and qualitative data collection, an intervention is designed. This intervention combines the design principles discovered with theories from gamification. From creative thinking and exploring the different means of gamification in a sustainability context, gamification was chosen as a suitable format for the intervention. The objective of the intervention is to stimulate people to think of sustainable solutions in their work by making them aware of environmental impact and actions. More important, it is a fun and interactive introduction to highlight the contribution one has to the total environmental footprint of the company. The game is designed to be played by project teams that start with the project's conceptual design phase within a marine contractor organization. The game's purpose is to become aware of the environmental impact indicators and actions and to share individual values by deciding what investments to make in reducing the impact of the fictitious project. Players are challenged during the game to make strategic decisions to design their fictitious wind project that will have an as low as possible environmental impact. This is to make sustainability and environmental impact more tangible for the project team and ensure that employees can start discussions on sustainability within the marine contracting industry from a common ground and experience on sustainability.

Moreover, using a game which is played in real life, certain aspects that are considered to be important when analysing behaviour can be addressed. One of the crucial levels of influencing an employee's behaviour is implementing factors on an individual level. Focusing on individually targeting how one behaves will influence the values and personality traits which can positively contribute to making decisions about taking care of the environment.

In order to formulate an answer to the main research question of this research, 'how to stimulate and support sustainable behaviour within project scope in a marine contracting organization?', several sub-research questions have been established to gather information to arrive at a well-founded conclusion.

Answering the sub-research questions has shown that the design principles based on literature and qualitative study were successfully implemented into the intervention game. This results in a design linking how people cope with the sustainability challenges daily within the project scope to the game that proposes actions to improve one's project and performance. The game is demonstrated and evaluated, and a finalized design can be seen in the research. The design principles of this game, to make players from a marine contracting background aware of sustainable aspects in project design, are illustrated in the figure below.

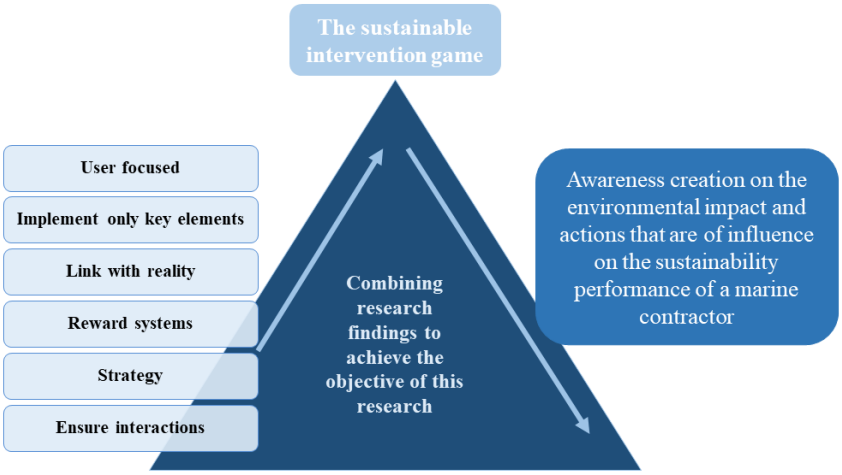

Figure 1. Going up: design principles that are used to design the intervention game. Going down: the deliverable of the game that is in line with this research's objective and helps give an answer on how to stimulate and support sustainable behaviour (own illustration).

With this game, the company and the industry can tackle the sustainability challenge from the top down by investing in technologies that help reduce the company's footprint and bottom-up by stimulating and supporting sustainable behaviour through the intervention game.

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Abbreviations

Business Unit	BU
Conference of the Parties	COP
Design Science Research	DSR
Design Science Research Model	DSRM
Emissions Trading System	ETS
European Climate Change Programme	ECCP
Heerema Marine Contractors	HMC
International Marine Contractors Association	IMCA
International Maritime Organization	IMO
Key Performance Indicators	KPI
De Koninklijke Vereniging van Nederlandse Reders	KVNR
Marine Engineer	ME
Organization for Economic Co-operation and Development	OECD
Program Manager	PM
Project Engineer	PE
Sixth Assessment Report	AR6
Sustainable Performance	SP
Sustainability Development Goals	SDG
Theory of Planned Behaviour	TPB
United Nations	UN

INTRODUCTION

1.1 Background

Climate change is a global problem, and the effects can be seen daily in the news. Glaciers are shrinking, rising sea levels and extreme weather cause floods and droughts. The results of our human-induced atmospheric emissions are more tangible than ever. After the Glasgow COP26, the global climate summit by the UN, where 197 nations agreed to a new environmental pact, the alarming message is shared: 'It is time to do things drastically different to reduce our impact on the climate (ECCP, 2022). This advice has been adopted by world leaders that came together and shared their plans to limit countries' impact in line with the recommendations of tabethe IPCC stated in their Sixth Assessment Report (AR6). The report states that the impact on the environment by human induced actions must be minimized in order to limit the global temperature rise to 1.5°C. Therefore, sustainability plays a vital role in the political agenda of many countries. Nations structure their actions by taking emission targets and climate goals into account to release the pressure on our climate. On European level, the established European Climate Change Programme (ECCP) helps to assess the most sustainable and cost-effective policies to cut greenhouse gas emissions (ECCP, 2022). An example of an approach based on the European Union's climate plans is the European Green Deal. This package has been implemented to force nations in the right direction. It aligns current laws with ambitions for 2030 and 2050. The European Green Deal states that in 2030 the net greenhouse gas emissions will be reduced by 55%, accompanied by laws and regulations to achieve this goal (Fit for 55, 2022). Summing up, the change in our climate and the accompanying statutes and legislations (institutions) force social and economic changes. Accordingly, every industry will experience this and has to put effort into a more sustainable way of working.

Sustainability in the marine contracting industry

This research focuses on the marine contracting industry, part of the overarching shipping industry evaluated on its environmental performance, bearing in mind the already established and future institutions, social impacts, and economic factors. The shipping industry covers nearly 3% of global emissions, equivalent to 940 million tonnes of CO_2 annually. Accordingly, the EU has initiated to involve the shipping industry in the Emissions Trading System (ETS) from 2023 onwards, which results in that organizations must pay for their amount of emitted greenhouse gasses (Reducing Emissions from the Shipping Sector, 2022). Including the shipping industry in the ETS would create; a carbon price for the industry, boost the demand for renewable, low-carbon, and alternative fuels and infrastructures, and it will result in a revision of the renewable energy directive and the existing energy taxation.

These adaptations in the regulatory system are on an industry level. However, this research is executed in light of a specific industry segment: the marine contracting industry. This industry is responsible for the transport, installation, and removal of structures offshore. A marine contractor can deliver the job, whether a wind farm, an oil or gas platform at sea or a future renewable energy platform for producing H2 or Carbon Capture and Storage. Using different (crane)vessels and technological processes, they can transport, lift, place and decommission burdensome structures at sea under different conditions.

In line with the European Green Deal, marine contractors have started to focus on a suitable sustainability strategy and set ambitious targets to reduce the impact of their operations. Organizations must act now by measuring and monitoring their impact on the environment and discovering how they can create sustainable values. This new way of working goes hand

in hand with encouraging people within the organizations to be creative in thinking of new solutions and make them feel empowered to support the organization's sustainable strategy and targets (Polman & Bhattacharya, 2016). This begins with creating awareness among employees about the sustainability challenge and the organization's ambitions. Pointing the entire organization towards a more sustainable way of thinking is a start to initiating sustainable solutions in any department. Where ideas will possibly come from different angles that contribute to the overall sustainable performance of the organization. But, initiating idea-sharing regarding sustainability or getting people to think about the operational impact in line with sustainability is not yet included in marine contractors' current way of working. Ensuring this may result in a faster transition to becoming a more sustainable industry that puts effort into reducing and limiting its impact on the planet. This change in acting and thinking about sustainability can be considered as an essential behavioural change within an organization towards a more sustainable way of doing business as a marine contractor.

Regarding the above, two drivers of why it is crucial to stimulate sustainable behaviour within a marine contracting organization are illustrated.
Firstly, the contribution of marine contractors to the effects of climate change and its impact on the environment. It has been shown that marine contracting organizations are part of an industry that plays a significant role in reducing and limiting the environmental impact to reach the reduction targets. Following the European Green Deal, the industry will be part of a regulatory system (ETS) that will force organizations to behave differently concerning the EU sustainability ambitions and targets. This driver can be seen as an external enforcement in which the market is heading.
The second driver is inseparable from the previous one. The industry acknowledges the essence of acting upon its environmental impact and initiates sustainable strategies. Regarding new sustainable strategies, organizations must be aware that introducing reduction targets and sustainable ambitions requires a more sustainable way of working. Making employees aware of the sustainability challenge one faces and informing them how their decisions influence environmental performance contributes to an organization's sustainability performance. Therefore, one should become aware of the behaviour and how it influences the environmental impact to achieve the ambitious reduction targets and strategies.

1.2 Problem statement

‘The problem addressed in this study relates to the organizational mission of marine contracting organizations to contribute to the global sustainability challenge: stimulating and supporting sustainable behaviour.’

This problem statement has been established based on the following assumptions regarding marine contracting organizations. The first assumption concerns the challenge within organizations to implement sustainable strategies and see actual changes in the decision-making of the people at the workplace.

- ‘Marine contracting organizations experience difficulties implementing the managerial plan to stimulate and support sustainable behaviour at the workplace.’

This assumption is fuelled by the efforts of the International Marine Contracting Association (IMCA) to examine the code of practice for environmental sustainability (Burnley, 2022). This organization and its members try to get a hold of how to ensure the transition towards

sustainable shipping in the marine contracting sector. In addition, this assumption is also in line with the search for organizations to align their businesses towards a more sustainable one.

The following assumption regarding the current situation in tackling sustainability within the marine contracting industry is:

- ‘Supporting the global and EU sustainability targets should become among the top priorities in the marine contracting sector.’

Delivering the European Green Deal is an example of how the industry is forced to include sustainable strategies in their businesses to contribute to the world's climate goals. In 2005, the emission trading system was initiated, and the shipping industry was, and still is, excluded. With the current knowledge that shipping will be included in the ETS in the upcoming years, the topic has been on the agenda since the organizations await financial consequences if they do not act accordingly. Before this, the sector focused more on cost and operational effectiveness than sustainability. This assumption confirms that not taking action on organizational sustainability performances and climate ambitions will follow in financial consequences. In other words, behaving towards a more sustainable way of working as a marine contractor will contribute to the industry's support towards global and EU regulations.

A complex challenge to tackle sustainability within marine contractors

The need for organizations to engage with sustainability is clear, but how can an organization best approach this? From the assumptions above concerning the problem statement of this research and the background information, this paragraph illustrates the research gaps this MSc thesis will focus upon.

Implementing a sustainable strategy within an organization asks for a change in the perspective or behaviour of its employees. Every employee must become aware of the ambition and mission statement in order to achieve the desired result it is intended to. In that view, making people aware of the sustainable pathway a company tries to find is essential. Because initiating a new ambition concerning sustainability is one thing, ensuring an organization will execute it is a second.

Tackling the sustainability challenge within an organization is difficult; it is a complex challenge in which socio-technical aspects play a crucial role in becoming a more sustainable organization. The social aspect considered in this study is the factors that influence an organization and an employee, internal and external. Examples are the influences of environmental organizations that will be in the waters of contractors or the values of the people in the organization that decide how projects will be executed. In that sense, many social aspects should be considered when transitioning to becoming a more sustainable marine contractor. Also, people must become aware of the environmental impact to make decisions that are beneficial to the environment.

The technical aspect of this research area is the ability to manage and measure one's sustainability performances and make the performance visible in projects. For instance, the emissions caused by burning fuels on the vessels as well as the impact on the environment through installing an offshore structure. Besides, technical decisions about logistical pathways or to work with suppliers influence the project's sustainability performance. The knowledge to make those decisions technically sustainable will contribute to the organization's sustainability goals.

The last aspect which makes the sustainability challenge more complex is the ability to enable people to think of all dimensions simultaneously. Sustainability concerns social, economic, and environmental aspects; designing solutions that have no, low, or a neutral impact on all is hard. But not impossible. These three aspects are essential to consider in exploring what approach is suitable to make people aware of sustainability within a marine contracting organization.

Managing sustainability from a marine contractor perspective

Within the marine contracting industry, years of experience have persevered. However, a change in the way of working to adapt to a more sustainable shipping industry is expected. Where the offshore industry started as an upstream sector of the oil and gas industry, it is developing into an industry where renewable energy is also playing its part. The knowledge gained to retrieve oil and gas from the fields under the seabed is found from 1947 and onwards. From that moment, the industry grew, and at the same time, more challenges and barriers appeared. Different technologies have been developed to work more efficiently and effectively, and more stakeholders have entered the market. All with the same incentive to save costs and be the best contractor to do the job (Cabinet Secretary for Rural Affairs and Island, 2020). The financial incentive is pressing on the market where many projects used to be rewarded to the cost-efficient contractor. It should be the other way to achieve the Fit for 55 goals. This cost-efficient mechanism is an example of how the industry works, taking sustainability not yet into account in the execution of their projects. For a marine contractor, it is challenging to involve sustainable aspects with no financial support from the project owner, who has installed a list of requirements to fulfil. Because of this, there is not much flexibility to adapt specific processes within the project development. Therefore, the organization experiences less innovation and lower motivation to contribute to its sustainable development goals from its employees (HMC data, 2022). Besides, projects tend not to focus on measuring their sustainability performance unless the client specifically asks for it. Thus employees are not used to tracking or thinking of sustainable solutions within the projects.

From the outside perspective, an organization pays much attention to operating coherently to the sustainable development goals. Technological breakthroughs support the transition towards a greener industry and are important to provide a platform for research and development of innovative solutions (IMO Environmental technologies in focus on World Maritime Day 2022, n.d.). These developments are most considered external efforts of the organizations. However, the IMO also addresses the importance of starting the conversation and spreading knowledge among maritime organizations within operations and projects to support the journey of becoming a more sustainable industry. This triggers businesses to rethink and redevelop their strategies and way of working, the products and services they offer to the market, and the resources used for that (Silvius & Schipper, 2020). Changing to more sustainable project management is an essential global trend in organizations today (Dionsi et al., 2016). Especially for marine contractors, there is potential to develop sustainable solutions within project teams internally because they make the decisions from conceptual design to project execution.

Research gap

To sum up, taking into account the drive to become a more sustainable marine contractor and the question of how to do that fuels this MSc thesis's research area. Since external developments provide a platform to think of sustainability and the vital contribution of internal awareness regarding sustainability to improve the performance of a marine contractor, nurture this research. This asks for an internal intervention that explores how to make people aware of

their decisions in line with the companies' sustainable performances. Besides, this intervention is essential to stimulate and support employees towards more sustainable behaviour within their roles and responsibilities. To explore this research area, literature and a qualitative study determine what aspects of the challenges mentioned above of sustainability for marine contractors must be included in this intervention.

The scientific contribution that this research will grasp upon is how to tackle the internal sustainability challenge by stimulating and supporting the behaviour at the workplace within the project scope of a marine contracting organization. This, by designing an intervention that will make the employees within project teams aware of their behaviour and challenges them to determine whether their design decisions contribute to the company's sustainability performance.

1.3 Linkage with the CoSEM program

A CoSEM master thesis is focused on designing solutions for complex socio-technical problems. Hence, this research aims to design and assess how marine contracting organizations can stimulate and support sustainable behaviour, coping with internal and external influences a marine contractor experiences. This requires an analysis of how to influence behaviour and the challenge of organizations to build and manage a structure to support its sustainability performance. In addition, this research focuses on the technical aspects of assigning environmental impact indicators to actions through which employees can contribute. Moreover, this research designs an intervention that includes societal, technical, economic and environmental elements, which fits perfectly with the MSc programme Complex Systems Engineering and Management.

1.4 Research objective

The research objective of this thesis is to design an intervention that will stimulate and support sustainable behaviour. This, to create awareness among employees within a marine contracting organization on how they can contribute to the company's sustainability performance. Towards the design, the research will elaborate on three key intervention elements. Firstly, an organization must become aware of what influences the behaviour of its employees. Secondly, barriers and enablers within an organizational structure that ensure sustainable business should be discovered. Thirdly, specific environmental impacts and actions will be elaborated to create performance indicators for sustainable behaviour.
A profound intervention will be designed through literature and qualitative studies executed in a marine contracting organization. This intervention could be a part of the design process within project teams to initiate sustainable behaviour in the roles and responsibilities of employees. The intervention should ensure a quick win in making people within the organization more aware of their sustainable behaviour and considering the durability of the behavioural change and long and short-term steps.

1.5 Research questions

From the research objective and problem-statement, the main research question is formulated as follows:

How to stimulate and support sustainable behaviour within project scope in a marine contracting organization?

This research question triggers different steps to obtain background knowledge and theories on stimulating and supporting sustainability in a marine contracting organization. Stimulate behaviour in this research is interpreted as the activity to inform and make people aware of specific challenges. Supporting behaviour is defined as establishing the endurance of pro-environmental behaviour and keeping one motivated. From here, the following sub-research questions are established to serve the objective and to carry out the research in a structured way:

SQ 1: 'What is sustainable behaviour at the workplace, and what factors influence it?'
SQ 2: 'What sustainability management system is suited for a marine contractor to support sustainable behaviour?'
SQ 3: 'How should environmental performance indicators be taken into account to stimulate and support sustainable behaviour within project scope in a marine contracting organization?'
SQ 4: 'What intervention would fit a marine contracting organization to make employees aware of its sustainable behaviour and performance?'

Besides the literature study, a qualitative study is used to identify factors of sustainable behaviour. This qualitative study combines knowledge of the phenomena found through observations and explorative interviews within a marine contracting organization. In other words, the interviews will be analysed using the knowledge gained from literature on sustainable behaviour, finding the factors highlighted in the literature. This is done to create a considered answer to the main research question that is future-proof, will create new insights, and will help tackle the sustainability challenge of a marine contractor.

1.6 Research approach and approach

This research focuses on the demanding change for businesses to become more sustainable and the organization's ability to reflect this new way of working to its employees. It combines theory with empirical data through a pragmatic perspective on a socio-technical problem. A typical pragmatism research approach is characterized by the challenge of how the desired change can be implemented, with the aim of designing an intervention (Goldkuhl, 2012). This is also in line with how the addressed problem can be seen from the pragmatic perspective. Regarding the problem statement, exploring how the marine contracting industry should address sustainability internally and create awareness, this research focuses on achieving the desired objective.

A research approach is chosen for this MSc thesis and its defined research gap. Regarding the pragmatism perspective on the socio-technical problem of this research, the research will follow the Design Science Research approach (DSR). The main objective of a DSR approach is the problem-solving paradigm. This method tries to enhance human knowledge gained from established theories and findings in the real world by creating innovative solution oriented processes and services for organizational problems (vom Brocke et al., 2020). The DSR framework (Figure 2) consists of three elements, the environment, the knowledge base, and the design (Hevner et al., 2004). These three elements are briefly explained below.

The environment examines the research area in which the problem is analysed. People, organizations, and technologies influence this environment. From the environment, specific needs come forward to assess and evaluate the given contextual problem. Regarding this interaction between the environment and factors of influence, relevant problems will arise, which will be tackled in studying a to-be-designed intervention. From here, the knowledge

base is determined. The knowledge base offers theories and frameworks in which the problem can be analysed. One achieves rigor when found knowledge can be placed in the research context. Rigor in qualitative knowledge is the principle of establishing trust or confidence in the findings. The knowledge already available on sustainable behaviour and mechanisms to stimulate, is applied and follows the route to design. DSR design combines thus deductive research from the knowledge base and inductive input from the environment into the design. Figure 2 shows the DSR framework suited to this research inspired by the conceptual framework of vom Brocke et al. (2020). This DSR framework summarizes the environmental factors and knowledge bases that will be reviewed to arrive at a final design. This final design will be an ongoing process of evaluating already established guidelines and tools that form the building blocks of the intervention, with input from evaluations through qualitative activities to refine the design. This framework, combined with the formulated research questions to scope the research, will structure the design of this MSc thesis.

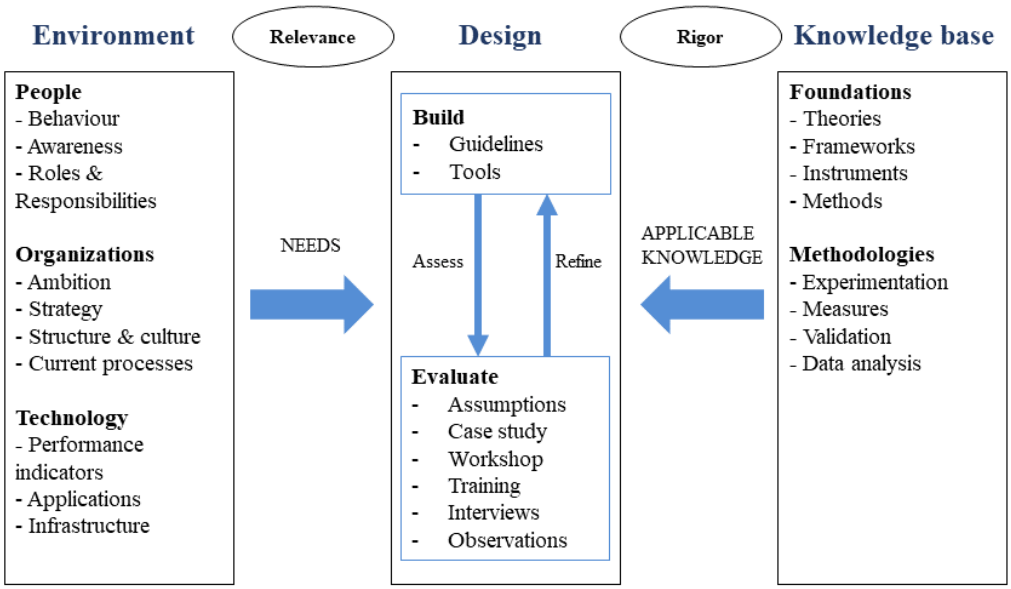

Figure 2. DSR framework applicable to this study inspired by the conceptual DSR framework of vom Brocke et al. (2020).

From this DSR framework, the pathway explained by the research of Peffers et al. (2007) will be followed. Their research sets out the methodology steps to execute DSR in six steps that fuel a Design Science Research Methodology as follows:

1. **Problem identification and motivation;** define the research problem and value the solution in the given context. Doing this will achieve a higher rate of motivation for the researcher and audience (Peffers et al., 2007).
   Resources for this process step: knowledge of the problem and the value of the solution.
2. **Definition of the objectives for a solution;** determine the objective of a possible design. This qualitative research withholds the possible structure of an intervention that will support the solution.
   Resources for this process step: state of the art knowledge of the problem and current interventions.
3. **Design and development;** the creation of the intervention. This activity oversees the functionality and architecture of the design. After that, a conceptual design is

established.
Resources for this process step: how theoretical knowledge can be coupled to the knowledge found in the real world.

4. **Demonstration;** this step shows how the intervention will solve the problem. This could be done through experimentation or other demonstration techniques. *Resources for this process step:* knowledge on how to use the intervention. Organize a try-out session that will be used to test whether the objectives are met with the conceptual design.
5. **Evaluation;** this step concentrates on how the demonstration phase was executed. The intervention is evaluated on its performance and whether the goal is achieved. *Resources for this step:* data collected via the demonstration method chosen and empirical evidence found from observations within the organization.
6. **Communication;** this step evolves the communication of the findings in the research. This will be done via findings from this thesis, a presentation, and the designed intervention.
Resources for this step: knowledge of the disciplinary culture within the organization.

To execute the steps elaborated by Peffers et al. (2007), resources are necessary to create a profound design ready to be implemented. In short, for this research, insights and knowledge gained from literature and qualitative study are crucial.

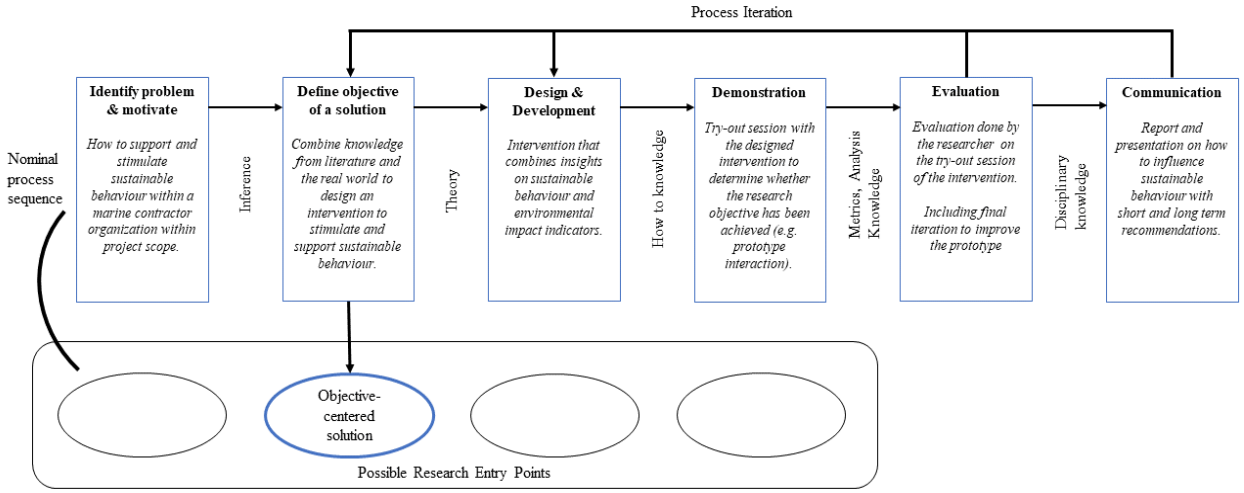

Figure 3. DSRM to create an intervention that will stimulate and support sustainable behaviour explained by vom Brocke et al. (2020).

Figure 3 shows the DSRM explained by von Brocke et al. (2020) in line with how this research will be executed. The six research steps are followed to retrieve information in line with how the research was constituted regarding the research questions.
To sum up, this MSc thesis tries to formulate an answer to the main research question; 'How to stimulate and support sustainable behaviour within project scope in a marine contracting organization?'. Following the DSR framework and methodology, research steps will be executed to answer sub-research questions and main research question. This while following the DSR methodology that is chosen because it challenges the researcher to design an intervention applicable to the research objective. In figure 4, the research questions, the DSR process sequence, the projected outcomes per step along the DSR, and the chapters of this MSc thesis are aligned. The sub-research questions provide subject-related guidance where

the DSR process determines the research step needed to achieve a thorough intervention design. The literature and qualitative study, chapters 3 and 4 provide the knowledge and data needed to create an intervention specifically focused on the current state of sustainability within project teams of marine contractor organizations. At the same time, chapter 5 will collect an answer to sub-research question 4 by demonstrating, evaluating and communicating the intervention design. The researcher can then conclude whether the intervention would fit and if the objective is achieved. Chapters 6 and 7 discuss the designed intervention, evaluates whether the intervention is ready to be used, elaborate on future research and illustrate the answer to the main research question.

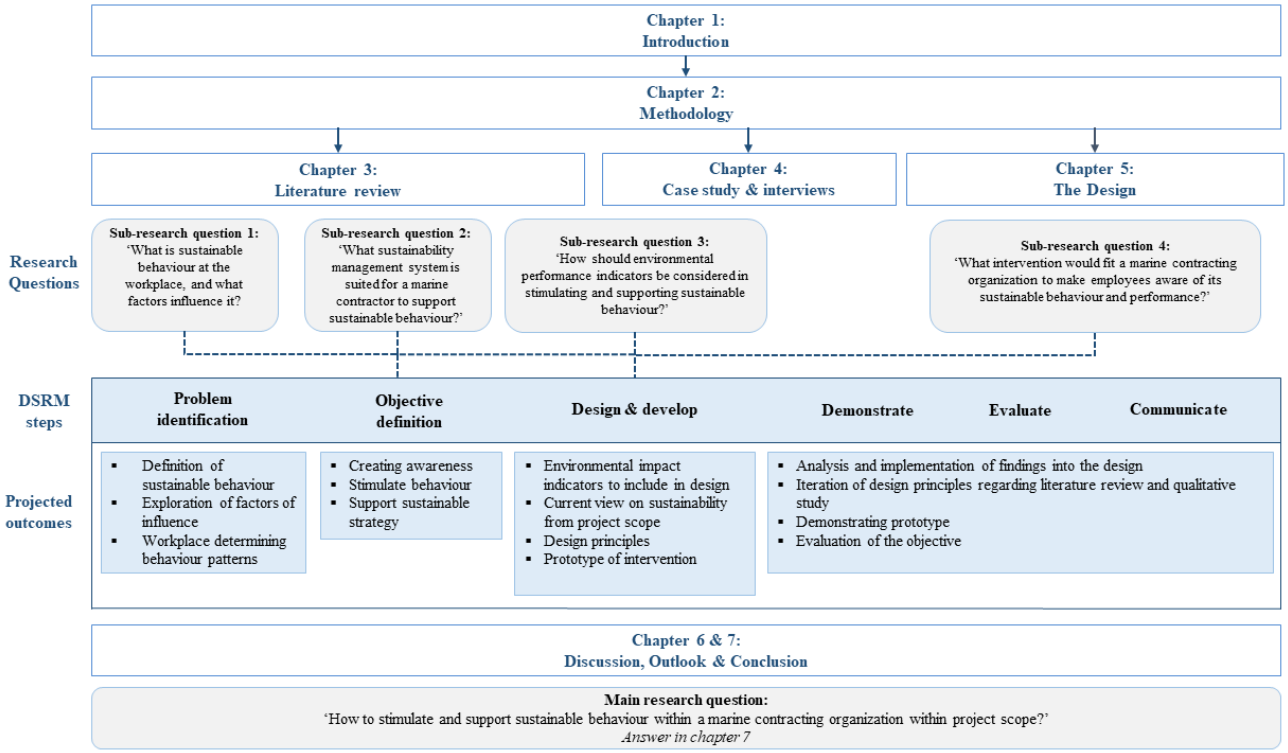

Figure 4. Visualization of how the research questions and DSRM process steps relate to each other and are reflected in the chapters of this research.

1.7 Thesis outline

This section shortly describes how this research is built up. Chapter 2 explains the methodologies used in this research. It discusses how each research step has been executed to formulate an answer to the sub-research questions. In Chapter 3, the literature review is stated. This chapter gathers the information needed to provide well-founded answers to sub-questions 1 and 2. In that way, context is given concerning the stimulation of sustainable behaviour and organizational management systems that will support the behaviour of employees. It helps to narrow the intervention's scope and aligns critical elements of how organizations can structure support and stimulate sustainable behaviour. The chapter closes with the challenges in tackling environmental impact and highlights what impacts and actions must be considered in the intervention.

Chapter 4 examines the qualitative study; it analyses the case study company, Heerema Marine Contractors (HMC) and highlights the data collected from interviews that have been executed within the project scope. Furthermore, it highlights what aspects of environmental impact are essential to include in the design. In chapter 5, the researcher has collected all the relevant data and will start designing the intervention. A conceptual design, evaluation, and a final design is established. At the end of chapters 3 to 5, key takeaways will point out relevant aspects found in the chapter which are taken into account in the design of the intervention. These key takeaways summarize the mains aspects found to answer each sub-research question handled in that chapter. Chapter 6 describes the limitations of the research and presents a possible implementation plan for the intervention. Lastly, chapter 7 answers the main research question by answering all research questions addressed in the research. The research ends with an outlook, the scientific contribution and what this research could mean for the marine contracting industry and Heerema Marine Contractors.

METHODOLOGY

This chapter explains the methods and reasoning adopted to gather thorough information to answer the research questions formulated in this MSc thesis. Focussing on the six steps of the Design Science Research Methodology (vom Brocke et al., 2020), every step has contributed to the design of an objective-centered solution. In other words, this MSc thesis tries to describe the problem, after which the solution of this problem is subsequently followed by what the intended solution should look like. Multiple activities have contributed to answering the main research question during this research, and these research activities and their contribution will be elaborated on in this chapter.

2.1 Data collection

This research is split up into two parts of data collection and analysis. The inductive way of research is performed through a literature study on aspects that influence sustainable behaviour, managing sustainability in an organization, and environmental impact indicators. After that, a deductive qualitative study collected the empirical evidence in this field of research through open-ended interviews, explorative findings from conversations and training. Learnings from literature, deductive observations, and data collected via the interviews are used to answer this research's central research question and design the intervention.

From the DSRM, several efforts to obtain the right resources are essential to acquire the necessary data. In the figure below (figure 4), the research methodology aligned with the research steps to collect the correct data is illustrated to highlight each step from the methodology proposed by Peffers et al. (2007) on objective-centred solution research.

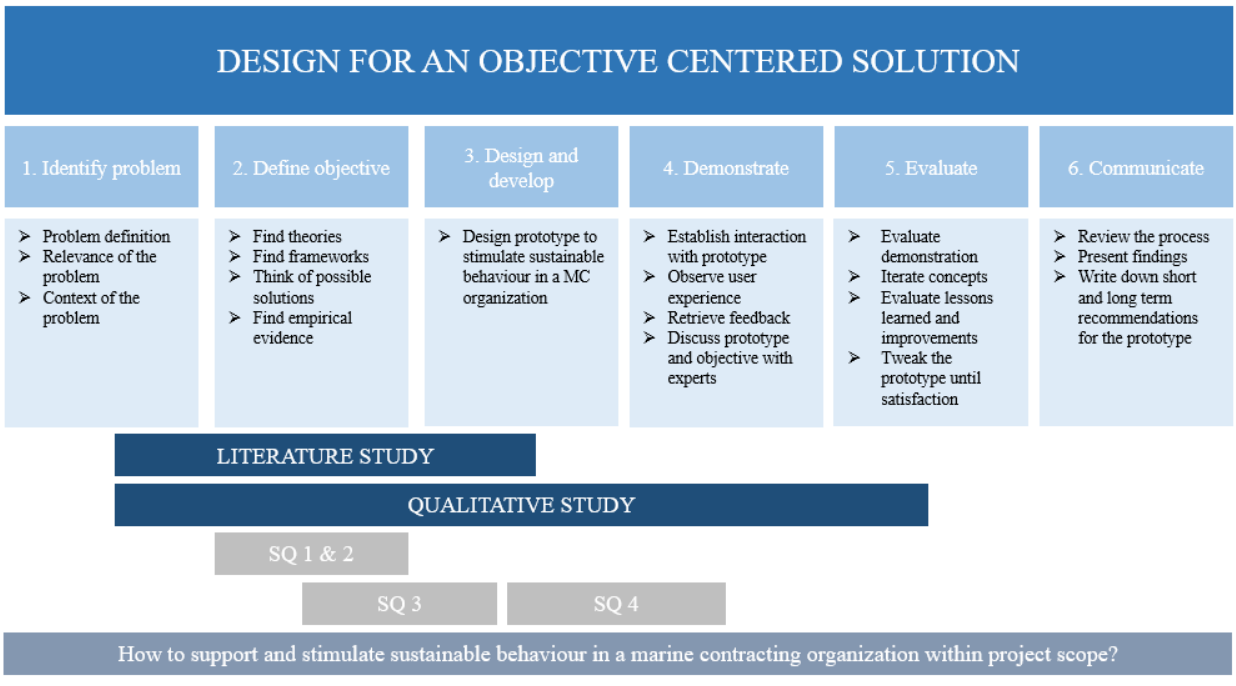

Figure 5. Illustration that combines the DSRM research process steps with the data collection methodologies and actions (own illustration).

This research's empirical and practical data is retrieved through a case study performed at Heerema Marine Contractors (HMC). Using data and knowledge from articles, books, journals

or other publications covering sustainable behaviour, managing sustainability within an organization and explaining what environmental indicators a marine contractor should consider having ensured the knowledge base for steps 1 to 3. Towards the design and development step, the literature study has been profound in structuring the research and narrowing the scope of the solution. The researcher has made this decision based on estimations concerning feasibility and explicitly focusing on analysing quick wins to stimulate sustainable behaviour. Moreover, the qualitative study activities started with the literature study since it helped shape the scope of the problem, objective and design. This to make a thoughtful analysis of the problem and what the desired solution should look like. After performing research steps 1, 2 and 3, demonstration and evaluation followed. These activities were performed within the case study company and were focused on testing the prototype through interaction with its users and evaluation (Zijlstra et al., 2020). During the next step, the user interactions were analysed in the prototype. Focussing on whether the prototype succeeded toward this research's objective, stimulating and supporting sustainable behaviour. This process step has helped to shape the communication of this research. The communication step includes two research deliverables; one is this MSc thesis which provides interesting findings on analysed sustainable behaviour in a marine contractor organization. The other one is an intervention design especially focused on being used by project teams that want to start exploring the possibilities of including sustainable impact indicators in their authentic project design.

2.2 Literature study

A literature study has been performed to establish a profound knowledge base on this research subject. Instead of a formal structured review, the literature study performed in this research was more narrative. Most narrative literature reviews have been executed to perform a state-of-the-art analysis on a specific topic. Since the research area of this MSc thesis is relatively broad, a shared sense of all aspects of sustainable behaviour and the context of environmental impacts to cope with as an organization was required, this format is known to retrieve a consensus on a topic. It describes current beliefs (Stratton, 2019). This methodology searches for the frameworks and theories relevant to this topic of discussion. At last, a narrative review also proposes the possibility of being more flexible and interpretive in the objectives. This research was helpful because observations within the case-study context shaped the problem and objectives along the research steps.

The narrative methodology

Even though the performed literature study is defined as narrative, a particular common thread was maintained per research topic. To start with, the first area of research considers the definition of sustainable behaviour and the appearing factors that influence behaviour. This literature review was executed by analysing articles that focussed on analysing what kind of behaviours one can find in an organization and how they are affected. From this search, snowballing through the references has secured a selection of articles to collect a broad view of how the behaviour of employees is influenced. Google Scholar and Scopus were the main search engines used. Search terms can be found in appendix F.

The second aspect of the literature review in this research focuses on what management systems fit an organization that wants its employees to behave more sustainably (Silva et al., 2020). More precisely, what management system is preferred in this sustainability strategy? From this search, relevant articles have been found that proposed information on how management systems should be designed to create an organization that engages all employees

to behave sustainably. In addition, a helpful case study found by George et al. (2016), which is executed within an oil and gas company. This case study examines the pathway of this company by analysing the integration of specific management systems toward sustainable behaviour. This study and the article of Blackburn (2007) proposed helpful insights into what roles, responsibilities, enablers and barriers an organization has to cope with when tackling the sustainability challenge explained in this thesis.

The last part of the literature study was performed to gather knowledge on the further context of this research. This thesis focuses on how to support and stimulate the sustainable behaviour of employees within the marine contracting industry, so it is essential to set the findings on sustainable behaviour into the organizational sustainability challenges from the marine contracting perspective. Finding literature specifically focussing on marine contractor sustainability performances and challenges is limited. Therefore, articles on marine shipping and/or transportation have been used to examine the environmental impacts and indicators to cope with.

The executed literature study adds to the DSRM since it combines a flexible way of gathering knowledge with the essence of gathering a specific amount of knowledge to ensure creative design (Peffers et al., 2007). The latter is essential because the researcher must have some time to allow the knowledge to come to her to start designing the solution (Zijlstra et al., 2020).

2.3 Qualitative study

To perform the second part of this thesis, a qualitative study is chosen to be suitable since this thesis touches upon new fields of research. Besides, a qualitative study approach allows the researcher to derive conclusions interpretively. This is done by being curious, emphatic and open-minded. The researcher tries to understand the underlying meaning of the shared knowledge and experiences that participants in the study bring to them (Yin, 2016). Retrieving qualitative data of a case study company while simultaneously working on the research within the company is of explicit value to the outcome of this study. At HMC, colleagues were intrigued by the research and perspectives or ideas on the sustainability challenge were shared easily. This made the focus of the study more precise, and at the same time feasibility of the intervention was secured.

Qualitative data collection

Qualitative interviews are used to collect data that touches upon the topics studied in this research. It is a data-collecting method that will help shape the intervention in the design, development and evaluation phases. The qualitative study also includes observations and exploratory conservations during the research period; these have influenced certain design decisions but were not tracked via a structured interview. Besides, experts were asked to give their views to acquire knowledge on designing an intervention and evaluating the intervention. Their expertise helps to validate the research and analyse further points for investigation. The first two research phases took place in parallel during the study period, and the last data collection method was used towards the end of the study.

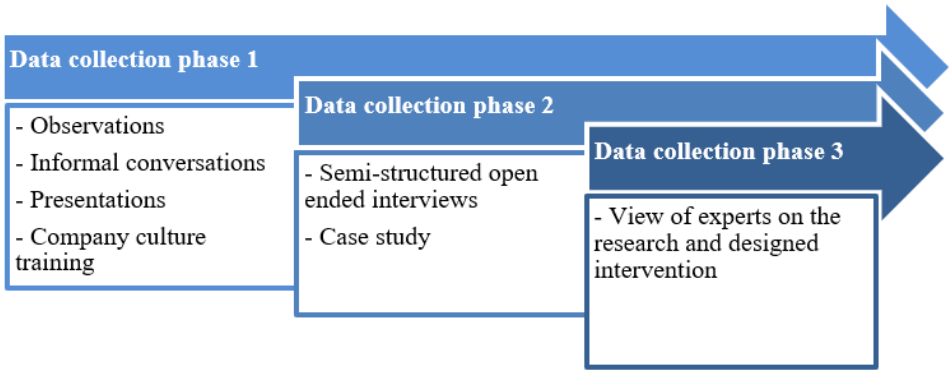

Figure 6. Visualization of the qualitative data collection phases (own illustration).

Qualitative data phase 1: explorative actions to shape the problem and explore the area of research

While working in the same environment as doing research, one can obtain experiences, feelings and knowledge in an unstructured way in the form of conversations and experiences at the workplace (Gall, Gall & Borg, 2003). These informal conversations were held during the research period from May 2022 until October 2022, neither time nor place at will. These conversations were mostly initiated by the researcher and employees of HMC about the research topic. During these conversations, the researcher addressed the study's objective, from where employees posted their views or opinion on the topic. These have influenced the scope and objective of this thesis. While pitching the area of research, some assumptions emerged that have been taken into account in the current analysis of managing organizational changes. One shared experiences on other earlier initiatives have or have not been embraced by the company. Whether assumptions were verified or falsified, these findings have significantly contributed to this research.

Moreover, specific training was followed to obtain a better overview of how earlier problems on changes regarding behaviour were tackled. The first training followed was the Dare to Care safety programme training. This training is initiated since the offshore industry must secure safe operations and should do everything in their power to prevent accidents. During this training, all new employees within the company got introduced to the safety measures on and offshore. The participants had all different roles within the company and shared their experiences with safety while the trainer explained the essence of behaving safely. The purpose of this training was to make one aware of the safety aspects a marine contractor has to deal with.

The second training followed was the Founders' Mentality training which was also held with an interdisciplinary group of people who had just attended the company. In addition, this training focussed on behaving within one's role and responsibilities in the desired way, explained by the Founders' Mentality by Zook & Allen. This mentality touches upon the three main focus points of how HMC wants its employees to think and behave during their practices at work. Key takeaways from this training were that it focuses on educating people about how the Founders' Mentality works as it tries to inform one about having an owner's mindset, a frontline obsession and awareness of insurgency. The structure of the training, the implementation of this behavioural change and the drivers to do so have secured valuable insights towards defining the design principles of the to-be-designed intervention.

Both pieces of training have in common that behavioural change is forced through organizational influences via training and promotions of the programmes. Therefore, lessons learned have been discovered and will be helpful in this research.

Qualitative data phase 2: semi-structured open ended interviews

The second part of the qualitative data collection withholds the semi-structured open-ended interviews. These interviews are executed to understand employees' perspectives on sustainability within a project and what factors would stimulate or support sustainability. The interview questions were built up in order to retrieve the perspective on sustainability towards the organization as well as towards project work. Besides, questions were structured so that the participants could explain their vision toward sustainable thinking and behaviour. The semi-structured interviews led to open conversations with the employees focussing on their role in the project design towards sustainable actions and influences the organization could perform to handle the environmental impact. All interviews were conducted formally, in a meeting room or online. The objective of this research determines the line of interview questions. Thinking of the objective of creating an intervention that stimulates and support sustainable behaviour within the project scope, the interviews are used to get an overall picture of how sustainability currently plays a role within project teams. Besides, exploring the research area of the sustainability challenge of marine contractors ensured the researcher with the appropriate knowledge to execute the interviews. This has assured the researcher of asking further questions and going deeper into the answers obtained. The precise interview script is added as an appendix of this MSc thesis; see appendix G. The following two paragraphs will elaborate on the procedure and coding of the interviews.

Interview procedure

The interviews involved nine employees from HMC, which varied in age, eight men and one woman, with varying educational backgrounds and years of experience within the company. All had been, or still are, involved in the He-Dreiht project. The context of this project will be explained in section 4.2.

The semi-structured open-ended interviews lasted 45 minutes. Participants were asked to share their experiences working at HMC, what sustainability aspects they oversee within the company and project, their responsibilities, and how they can promote more sustainability in certain decisions or solutions. Besides, other questions were asked about the factors influencing the sustainability performance of the company and project. At last, they were questioned about how they would see the implementation of sustainability within their work in an ideal situation. The invitation to participate in the interview was sent via email, interviewees were free to accept the invitation, and no further preparation for the interview was asked. Appendix F shows the questions posed during the interviews.

The Sr. project manager of the He-Dreiht project suggested the group of participants when the researcher pitched the scope of the research. According to the Sr. project manager, this group of people were and are involved in the different design phases of the project, coping with environmental aspects and involved actors. This was important since the researcher is interested in what role one plays within the project and the influences of specific actions or decisions made on the environment. Focussing on one project group also creates a common ground in which the exploratory data collection takes place, considering the same context of environmental aspects, influences and factors to all interviewees. The list of employees who were interviewed is found in table 1.

Table 1. The list of employees interviewed for this research. The codes per interviewee are made to refer back to in the summary of the analysis.

Code	Date of interview	BU	Role	Years of experience	Within the project responsible for
I.1	5-07-2022	Operations & Equipment	Equipment Manager	14	Thialf asset and equipment manager
I.2	7-07-2022	Wind	Senior Installation Engineer	7	Engineers the marshalling and transport to the yards
I.3	6-07-2022	Wind	Project Engineer – Freelance	3 months	Bubble screen installation
I.4	5-07-2022	Wind	Project Engineer	12	General engineering tasks
I.5	13-07-2022	Operations & Equipment	Manager Non Floating Equipment	26	Development of non-floating equipment
I.6	8-07-2022	Technology & HSE	Marine Engineer	3	Marine Engineering
I.7	7-07-2022	Wind	Marine Engineer	5	Marine Engineering
I.8	16-08-2022	Wind	Project Manager	1	Design package of the template for installation of the monopiles
I.9	15-07-2022	Wind	Senior Project Manager - He Dreiht	21	Main responsible person of the project

Open-ended interviews were held to gain more knowledge on how employees at the workplace see sustainability within the marine contracting context. The goal of the interview was to retrieve employees' thoughts on the company's current sustainability performances and how they experience the sustainability factor during their daily working routine within the project scope.

How they experience sustainability as a factor of influence within their daily working routine has been collected. The structure of the interviews was, all the same, questioning the same to each participant. However, some interviews go deeper into particular perspectives than others.

Coding of interviews

The mission of Heerema Marine Contractors is: ‘to make the impossible possible offshore’ and their ambition is: *‘To be the leading marine contractor creating sustainable value(s) for clients and stakeholders*’.
Within the semi-structured open-ended interviews, which lasted approximately 45 minutes, participants were asked to share their experiences working at HMC. Specifically, what sustainability aspects they oversee within the project, their responsibilities, and how they can promote more sustainability in certain decisions or solutions. Besides, other questions were asked about what are the factors that influence the sustainability performance of the company and project (see appendix for interview setup). At last, the employees were questioned about how they would envision the implementation of sustainability within their work in an ideal situation. Summaries of the interview findings will be elaborated on in the next section of this chapter.

The invitation to participate in the interview was sent via email, participants were free to accept the invitation, and no further preparation for the interview was asked. The group of participants was suggested by the Sr. project manager of the He-Dreiht project when the intention of the interview was discussed with the researcher. According to the Sr. project manager, this group of people have been and still are involved in the different phases of the project.

All interviews were audio recorded under the consent of the interviewee. The transcription has been done with the use of the Otter.ai software tool. With this tool, the interviews were transcribed. Then, manually listening to all the interviews separately, missing words were added, inaccuracies were corrected and stop words were removed from the transcription. Editing has been done to create more brevity; words or clauses that did not contribute to the primary understanding of the data were removed from the transcript. When a workable transcript was generated, it was further analysed using the software tool Atlas TI. This tool is used to apply codes to unstructured text and helps to identify and visualize content that can be used for basic text analytics.

With the transcripts in place to start analysing the data, the phases of a thematic analysis explained by Braun and Clark (2012) are followed.

Qualitative data phase 3: collecting knowledge from experts

To gather knowledge on gamification, evaluate the prototype and reflect on the research, the researcher used the insights of experts on gamification and climate psychology. Once the researcher has come up with the idea to start exploring how gamification could be of use to stimulate and support sustainable behaviour, the first expert was used to verify this idea.
A conversation of half an hour was held with Mattijs Franken, who worked at Frisse Blikken, a consultancy firm that is specialized in setting organizations towards change. This change is mostly initiated with the help of gamification. The key takeaways of Mattijs Franken on designing a sustainable behaviour intervention using gamification were to keep it simple and create a game based on an already existing game. Moreover, keep in mind the goal that the game aims to achieve.

Gracia Bovenberg-Murris, project leader and game designer at the GameLab TU Delft, is the second expert to retrieve insights for this research. The first unstructured conversation was an online Microsoft Teams meeting. During this meeting, insights on what a game designer must consider while designing were discussed. Once the prototype had been designed and demonstrated, the insights of Gracia Bovenberg-Murris were again used to evaluate the prototype upon findings from the prototype interaction. This evaluation session was held at the TU Delft while showing the prototype of the intervention. The expert here was used as a sounding board to iterate different design ideas from the researcher into the second prototype.

The last expert view that is used in this research is collected from Gerdien de Vries - Associate Professor of Climate Psychology at the TU Delft. This conversation was held during the evaluation phase of the DSRM. A conversation of half an hour via Microsoft Teams was held to validate this study's findings. The unstructured conversation confirmed from the expert point of view that using games to create a fun activity for people contributes to initiating a behavioural change. Nevertheless, the expert also denoted some critical points on using games to ensure behavioural changes that can be found in chapter 6, Discussion.

2.4 Thematic analysis

For this qualitative research, a thematic analysis is chosen to execute the analysis of the interviews. The methodology of this analysis is deducted from the article of Braun and Clarke (2012). Thematic analysis is chosen to keep the analysis flexible and accessible. In thematic analysis, one finds deductive and inductive analyses. Inductive, since it is nearly impossible not to add something to the data while analysing, and deductive, since it is also hard not to look at the semantic content of the data when one codes for a particular theoretical concept

(Braun & Clarke, 2012). The inductive way of analysing data was chosen in this MSc thesis. From the first data collection research phase, explorative findings on the current context and status of the problem have been retrieved. Through inductive reasoning, the experiences and observations are considered to derive a common understanding regarding sustainability within a marine contractor. From there, data is gathered through interviews to test whether the observations can be verified, and a possible pattern is analysed. From the collected data, the finite scope of this research is aligned, and the design principles for a possible solution can be constructed.

Furthermore, for the data analysis, the data needs to be coded and organised in a structured manner to allow critical issues to be addressed quickly. The second research phase involves the analysis of the interviews. The raw data is translated into categories; in doing this, the six phases of thematic analysis were followed. When the transcription of each interview was ready for analysis, the path described in figure 7 was followed to develop a detailed analysis. The thematic analysis is explained by Braun and Clarke (2012). Explanations and a description of every phase can be found in the appendix H.

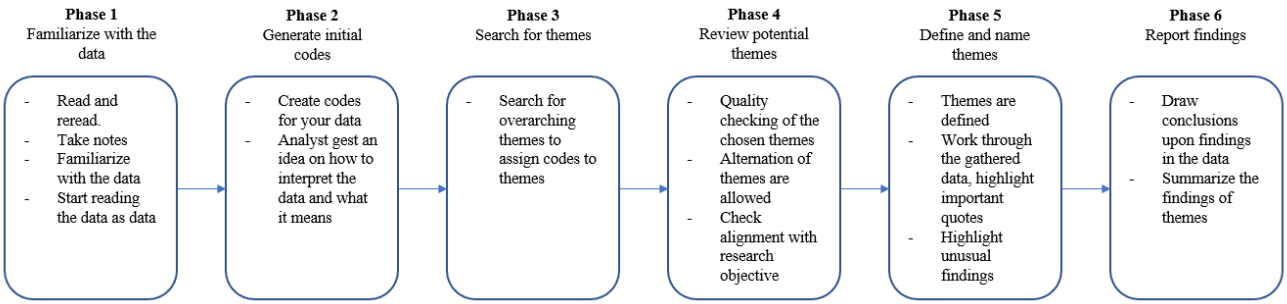

Figure 7. Thematic analysis explanation regarding the six phases described by Braun and Clarke (2012) (own illustration).

Regarding the thematic analysis, codes and themes determined by the researcher are used to structure the data to analyse the data. How these are used is illustrated in chapter 4 of this MSc thesis.

LITERATURE REVIEW

The first goal of this research is to explore how sustainable behaviour within a marine contractor can be interpreted and how factors may influence it. Therefore this chapter aims to answer the following sub-questions:

'What is sustainable behaviour at the workplace, and what factors influence it?'

'What sustainability management system is suited for a marine contractor to support sustainable behaviour?'

Analysing the definition of sustainable behaviour and the factors of influence is done by studying articles discussing behaviour at the workplace and how behaviour is influenced. Looking at what management structures fit a sustainable strategy is done by finding management systems applied to a sustainable strategy within organizations comparable to marine contractors. Enablers, barriers, roles and responsibilities learned from the research on how an organization aligns its structure with improving its sustainable performance are numbered for further application in the research.
The last part of the literature review illustrates the environmental impact that applies to a marine contracting organization. It explains the current status of measuring and managing the important indicators to consider in the design of the intervention. Besides, this information is essential to acquire more knowledge on the sustainability challenge of marine contractors that will help the researcher during the explorative interviews.

3.1 Sustainable behaviour

It is essential to share a standard definition of what is meant by sustainable behaviour within a company's culture and way of working. Therefore this section describes sustainable behaviour in general. First, a general definition is given, where factors of influence on sustainable behaviour are explained and lastly, how sustainable behaviour at the workplace can be influenced.

Sustainability can be explained as the situation humans live without compensating for their actions that could affect future generations (Filho et al., 2021). It addresses the social, economic and environmental aspects of products and services, and behaving sustainably is balancing the three aspects to maintain their integrity among them. Studies highlight environmental problems such as air pollution, global warming, water scarcity, environmental noise and damage to biodiversity (Filho et al., 2021). From the researcher's perspective, focusing on sustainability in the marine contracting industry, these problems are overlooked. Tackling these problems within the industry will not happen quickly. All actors must be aware of the impact, behave differently in order to become more sustainable. Thus, tackling this challenge asks for a behavioural change of all actors in the industry. Sustainable behaviour considers the set of actions that aim to safeguard the socio-physical environment. The design for sustainable behaviour by Filho et al. (2021) is reviewed in this research. The research emphasizes the importance of understanding the environmental consequences of human behaviour. Research refers to the link humans have with the change of state of our climate. Some say that the link between humans and the environment is weak and is sustained by other factors (Bamberg & Möser, 2007). Others infer the positive relationship between human behaviour and the consciousness of the changing environment. Therefore one needs to underpin this relationship humanity has with the environment. It needs to address that when behaving differently, this will be translated into less or more impact on the environment. This

sense of care is thus expressed in a certain way of behaving by individuals (consumers, users, employees) or collectively through the efforts made by governments or organizations. This can be explained as sustainable behaviour. They can safeguard their impact on the environmental, economic and social dimensions through how they make their decisions.

3.2 Factors of sustainable behaviour

Design strategies and implementation for sustainable behaviour have been researched from different perspectives. The first is interpreted from the individual, employee at the workplace view on sustainable behaviour from the research of Marcus and Roy (2017) and Duchi et al. (2020). The other perspective chosen is from the study of Silvius and Schipper (2020) on the influence of hierarchical roles on sustainable behaviour within the organization. Combining the insights of these studies will follow into an overview of what factors stimulate sustainable behaviour within an organization.

First, research on the individual behaviour of employees at the workplace is limited. However, one recent study has been found that analyses the variables of influence on sustainable behaviour. This article by Marcus and Roy (2017) highlights apparent variables that serve as indicators for sustainable practice at the workplace from the employee's point of view. In table 2, their main findings on sustainable behaviour predictors are described. The article distinguishes personal traits and values that influent the individual employee's actions in the workplace.

Table 2. Predictor variables summed up from the article of Marcus and Roy (2017).

Predictor variables on sustainability	**Definition**	**Assessed by the employee**	**Effect on sustainable behaviour and performance on sustainability**
Values	Deeply rooted beliefs about desirable goals and the way to achieve them.	Influences the environmental initiatives, have economic, social and environmental values that feeds the need to contribute to sustainable projects and actions.	○ How one reacts on environmental initiatives. ○ Promote ethical business conduct ○ Ability to establish an ethical organizational climate ○ Leadership comes forward when values are of importance to the individual
Personality Traits	More complex and psychological embedded way of how people think and behave.	Plays a key role in how one behaves in the organization. Hard to predict by others.	○ Determines the importance of sustainability aspects to tackle first. ○ Certain behaviour is analysed that pays more attention to sustainable actions. It plays a different role for employees with a specific personal traits pallet.

Marcus and Roy (2017) assume that the distinction between employees' values and personality traits impacts how a project team will address the three dimensions of sustainability. In other words, having employees work on a specific project with values more in favour of lowering the organization's economic impact would cause actions to be made in favour of the economic impact. Regarding this, it is said that taking one's values and personality into account would be an indicator of understandings one's behaviour towards sustainability (Marcus & Roy,

2017). One could predict upon the values of a project team what actions on sustainability could follow. In this context, values are less complex to influence than one's personality. Exposing one to new innovative technologies or alarming climate change consequences of operations would be a way to influence the value of an individual.

Second, while analysing individuals' values and personality traits, it is crucial to consider that personality traits are descriptive and come naturally. Values are essential for individuals to safeguard the beliefs that are dear to their hearts (Parks-Leduc et al., 2015). The research of Marcus and Roy (2017) on whether values and personal traits influent positive and negative attitudes toward organizational sustainability is established with two significant case studies. This relation is proven, to cite their work; 'values and personality traits independently and incrementally predict economic, social and environmental work-related behaviours' (Marcus & Roy, 2017). Addressing the outcome of the research by Marcus and Roy (2017) in the context of this thesis, it is valuable to place their conclusions into an organizational and managerial perspective. From their conclusions, it is vital to understand employees' value profiles, which gives managers an understanding of the starting point of the sustainability challenge of the project. Accordingly, actions to influence one's behaviour at the workplace towards promoting more sustainable behaviour may be much more effective.

Regarding how a manager should facilitate a starting point in the projects' sustainability performance, this section explains the manager's point of view on sustainable behaviour. The last article by Silvius and Schipper (2020) describes how managers should address sustainable project behaviour. In the article, the role of the project manager is suggested to be vital to the project to achieve better sustainable performance. In their context, sustainability by the project withholds the specifications and design of the project's deliverable (Brones et al., 2014; Aarseth et al., 2017). Other than the sustainability of the project, that focuses on the perspective of people within the process and in which the project is placed.

Furthermore, the manager's function involves processes considering stakeholder engagement, procurement, building the business case, retrieving an overview of the risks and communication of the project (Silvius & Schipper, 2020). Identifying what role the project manager has in the process of the project to combine both contexts of adopting sustainability is not well defined. What is known is that the project objectives and requirements may limit the project manager's power to influence the project deliverable. Nevertheless, one can interfere with the other project-related aspects such as the delivery process, performance, planning and organization (Silvius et al., 2012).

Table 3. Factors that influence sustainable behaviour of project managers from Silvius and Schipper (2020).

Factors appearing at the manager site that influences sustainable behaviour	**Possible consequences**
Personal attitude towards sustainability	Lower motivation to work on sustainable solutions and projects.
Structural conditions within the work environment	Pro or counteract sustainable behaviour can be detected, for example: having a centralized heating system can influence one’s preferences on the temperature in an individual working space. No contribution by the management to change their way of working will influence the output of the whole team or organization.
Make it a topic on the agenda	Is limiting since the project manager individually must have a moral compass & personal ability, potential benefit, potential risk and organizational fit to do so.

The study of Silvius and Schipper (2020) shows what patterns of factors stimulate project managers to address sustainability in their projects. Their research discovered three patterns of behaviour toward adopting new organizational strategies. The first one is an employee's pragmatic pattern, which complies with the control beliefs pattern of the Theory of Planned Behaviour (TPB). An example of a pragmatic pattern is when people see that a new way of working is successful, they will apply it. They want to see the practical part first, acquire more knowledge of the concept and see results. The second discovered pattern is the intrinsically motivated employee. This pattern shows much independence in claiming sustainable solutions. These employees assess sustainability as something they care for and see it as their responsibility to act more sustainably. The last pattern shown by Silvius and Schipper (2020) is the task-driven one. This pattern of behaviour illustrates the task-driven employees. These employees only see the necessity of adapting their work when the clients require it or when it is part of the project objective (Silvius & Schipper, 2020).

As mentioned above, these behaviour patterns can be seen in the context of the TPB. This framework is helpful as a theoretical framework for differences in behaviour. It is used to link beliefs to behaviour in the view of sustainability (Silvius & De Graaf, 2019; Silvius & Schipper, 2012; Cordano & Frieze, 2000). The framework consists of three parts of beliefs (Ajzen, 1991);

1. Behavioural beliefs, this belief follows from the fact that once the attitude of someone toward a particular behaviour becomes positive, it increases the possibility that one will behave in the desired manner.
2. Normative beliefs, this belief explains the influences of social pressure on people to perform according to societal norms. Moreover, a person would act, considering evaluating one's behaviour as a motivation to act in a certain way.
3. Control beliefs are built upon the estimation of whether a person would think the behaviour is easy or difficult to adapt in their work. In other words, one wants to reflect on whether adopting a more sustainable behaviour can adapt within their work to reduce the chance of failure.

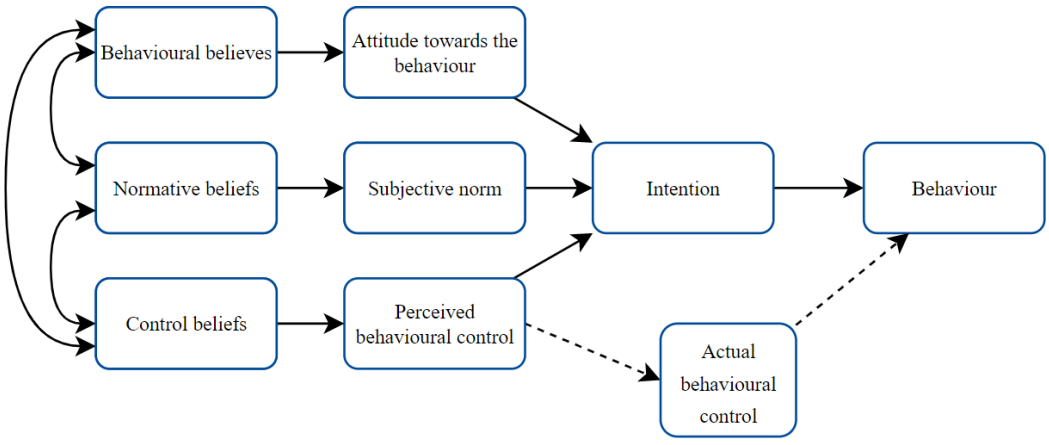

Figure 8. Visualization of the Theory of Planned Behaviour (Ajzen, 1991).

Connecting these beliefs to the earlier mentioned patterns, pragmatic patterns are part of the control beliefs of the TPB. Pragmatic people are not intrinsically motivated to add sustainable actions to their work responsibilities. However, they need to be encouraged with tools, knowledge and result-driven tasks to behave more sustainably. Intrinsically motivated people

are strong in finding motivation through their behavioural beliefs. These people care and feel the urge to take action on what they think is right to do.
Moreover, the project's objective is not to influence their desire to adopt sustainable actions in their project responsibilities. To be task-driven, the last behavioural pattern combines control and normative beliefs. In this pattern, external pressure and reward systems play a crucial role in motivating people to behave more sustainably. These people need to acquire as much context and prospects of the project to decide how to tackle the sustainability challenge in the project.

This framework is used to examine the fundamental building blocks of behaviour. The goal of the framework is to explain human behaviour. This conceptual model can be used to discover people's behaviour towards adapting sustainability in their way of working on projects. Given this research, making a distinction between individual behaviour and understanding where it comes from will be helpful to design. This framework helps to discuss what behaviour is seen in the organization before and after the possible intervention on stimulating and supporting sustainable behaviour is applied.

Factors of sustainable behaviour seen at the workplace

Changing one's behaviour is a challenge; changing the behaviour of all the people at the workplace is even more complex. However, there is some light at the end of the tunnel, people are slowly adopting more sustainable behaviours, and changes will not last long (Lilley, 2009). Initiators of the change of behaviour in the workplace are influenced by the changing attitude towards the environmental impact. Changing workplace behaviour towards a more sustainable one is getting more important because organizations are forced to lower their impact on the environment because of their operations. This reduction is not only feasible through technological developments. An essential part of this reduction is the change of behaviour towards creating more sustainable solutions. Companies put sustainable strategies in place to give the company a perspective to improve.

Nevertheless, one sees that this strategy needs to be backed by an accompanied change in behaviour (Young et al., 2015). From research, it is vital to have a company culture that readily accepts organizational changes when an organization wants to reduce its impact through changing environmental infrastructures or changes in the system (Young et al., 2015). To examine the behaviour of employees and the road to adopting a more sustainable behaviour, the research of Young et al. used a framework focussing on employee-level and organizational-level factors. The first focuses on the staff's attitude and whether employees value contributing to the organization's sustainability performance within their job responsibilities.

The second one focuses on the view and structure of the organization. It includes the willingness of the organization to implement new management processes, the resources available to facilitate sustainable behaviour and the effort taken to introduce a more sustainable culture (Young et al., 2015). The research by Young et al. (2015) reviewed 17 articles that explained individual and organizational factors. In their research, they have examined articles that drew their conclusions on adding behavioural change methods and evaluated them on the environmental performance indicator output. The individual factors touch upon the psychological and cognitive factors that infer certain employee decisions, and the organizational factors consider the context in which employees work. This research led to the additional factors of influence on sustainable behaviour at the workplace, namely: external

factors and group factors. In the following section, the four factors of influence on behaviour at the workplace will be further elaborated.

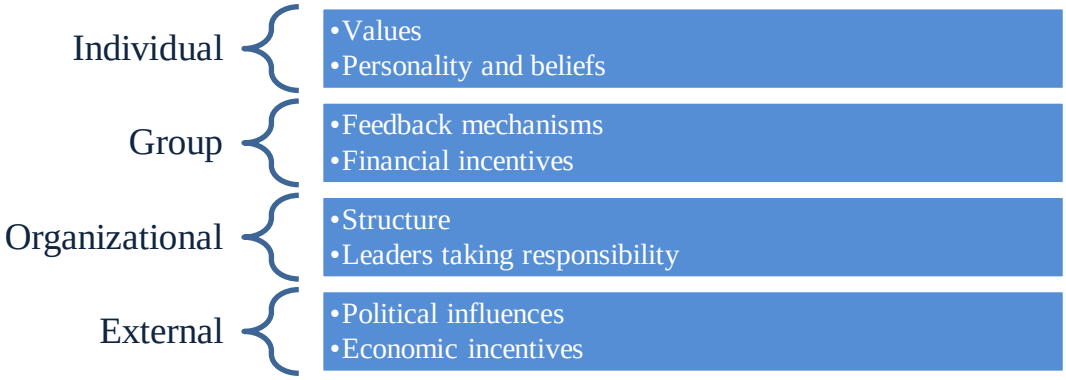

Figure 9. Overview of factors that influence behaviour at the workplace (own illustration).

Individual factors

Individuals significantly influence how they will behave in the organization in line with its sustainable strategy. This category embraces individual beliefs, values, attitudes and social awareness against sustainability. In this research, the individual behaviour performed at the workplace is analysed. Everyone is different within an organization; they can be distinguished in being a sustainability promotor apart from their peers who are not so sustainability-oriented within their job responsibilities (Marcus & Roy, 2019). From that perspective, differences in values and personality types suggest different actions from persona within an organization to support the sustainability strategy. The difference in values and personality types does not have to harm how one behaves towards sustainability. This difference can also help explain and analyse the variance in effects on the environment and can be of use to scope the company's impact. Specific individuals think of different aspects than others which is useful when an organization wants to create the bigger picture of the impact on the environment because of their operations. Linking personalities that prefer certain pro-environmental factors together can positively shape the scope of the operations and their impact. Nevertheless, the research by Marcus et al. also adds that linkages between personalities with a strong preference for certain environmental aspects forget the other environmental effects.

As mentioned in the previous section, values and personality traits are not the same and especially individually determent. Values can play an essential role for individuals when support needs to be created. It has been shown that values influence how people use energy, consume and manage environmental projects. Personality, on the other hand, is more complex. In order to understand how individuals view sustainability from their personal preferences based on their personality traits, several studies have been conducted. From the perspective of climate change and influencing one's personality, one can trigger a change via threat (Hopwood et al., 2022). A threat can cause anxiety. Thinking of climate change and the alarming consequences it has on humanity has the potential to influence one's feelings. These feelings can cause a shift in how a person will behave or interfere with values upon sustainable actions and initiatives (Hopwood et al., 2022).

Another aspect of the individual factors on how one behaves is environmental awareness. This can be divided into knowledge and interventions (Young et al., 2015). For example, when an

individual knows how a particular recycling method can be improved throughout the whole value chain, it will influence the employee's behaviour regarding sustainability. One is quicker in retrieving more sustainable solutions for a subject such as circularity with this knowledge than without knowing the process. Another way to create awareness is to train or educate employees. Showed in a case study executed in the Canadian chemical industry, people were improving their environmental performance because of the improved awareness of their environmental responsibilities within their job. Moreover, as earlier mentioned, people have been informed about the emergence of climate change to create environmental awareness, and behavioural changes have been reviewed (Hopwood et al., 2022).

Another aspect of the individual factor described by W. Young is the individual level feedback. This withholds two processes in which individuals create specific behaviour. The first is the ability to reflect on actions. In their research, they found that once one provided feedback on specific actions, people were also able to reflect. From this, one may conclude that information on more sustainable solutions or the current status and impact of operations must be communicated simple and concrete for employees to make sense of it. This enables the employees to connect the impact to their job responsibilities to contribute to change.

The other feedback mechanism for sustainable behaviour on an individual level concerns goal setting and feedback to improve. A case study invented a feedback portal on the companies' websites, of which interventions could be chosen concerning the performance of certain operations. With statistical significance, one could conclude that when one sets clear goals and feedback is used, sustainable programmes can be reached by accessories (Young et al., 2015).

The last aspect described by Young et al. (2015) is the individual-level financial incentives. Multiple studies show that people will change their behaviour with a financial incentive. An example of a financial incentive regarding more sustainable behaviour is the discounts on electric cars over petrol cars to lease. The paper also describes the step-wise incentive schema, which is based on retrieving rewards proportionally to the sustainable performance measured.

To sum up, the individual factors found in the literature that has to be considered when influencing sustainable behaviour at the workplace are:

- Personal values and personality traits;
- The environmental awareness and knowledge as well as the according responsibility of a person towards the environmental impact;
- The amount of individual feedback offered by the organization and;
- Whether there is a financial incentive to strive for.

Group factors

Group factors are explained as the daily relationships one has with colleagues and managers. This factor contains two aspects which are also mentioned in the individual factors: the importance of feedback and a financial incentive to drive sustainable behaviour (Young et al., 2015).
The team-level feedback is studied among the team's influences to encourage employees to implement sustainable solutions in their work. An example from a study executed in the Netherlands at a metallurgical plant focussed on the energy conservation. Both groups retrieved the same information, but only one group could retrieve feedback on its performance, whilst the other comparative group was also able to see the performance of others. This research resulted in a more sustainable behaviour shown in the comparative group (Young et

al., 2015). From this, one may conclude that whenever you offer a group of workers comparable information, they will be encouraged to perform better and thus behave more sustainably.

The group's financial incentive is based on a rewarding programme to influence the group's behaviour. Again, two groups of workers were analysed in a housing project in Hong Kong; while showing the financial consequences of (not) using sustainable materials in their construction, the workers were made aware. The group with the incentive reward programme used way more sustainable materials than those without. Following this analysis, one may conclude that a financial incentive positively affects the sustainable behaviour of a group. Another example of implementing reward programmes to encourage people to pro-environmental behaviour at work comes from the research of Barlett et al. (2011). The book highlights the relative moderate conclusions on the effect of a reward system to encourage people in the workplace to more sustainable behaviour.

Organizational level factors

The organization is responsible for the workplace structure in which employees can act and behave regarding sustainable developments. It should offer the right tools for employees to determine the environmental impact the operations could cause. Several factors from an organizational perspective affect the behaviour of employees towards sustainability, including the organization's environmental structure, management support, and organizational culture. Within this thesis, the focus will be on how the organization enables employees to behave more sustainably. To make them aware of the impact certain decisions made by the employees may have on the environment.

The first step to influencing the behaviour of employees concerning sustainability from an organizational perspective is to lay out the equipment to assess the performance of the company or operation. In other words, an employee at the workplace should be able to analyse their performance with the right tools, technologies or frameworks. In the paper of Young et al. (2015), the organizational influence is explained using the article of Holland et al. that examined the behaviour of employees through influencing situational cues. The conclusion of their research indicates that using percipient planning following the enabling of certain facilities and situations made people more aware. Specific planning is necessary to structure one's behaviour in; 'where, when and how to?'. From empirical evidence, this planning showed a significant contribution of employees who handled the waste stream of cups and paper more sustainably.
Another example of changing the company's structure is to influence workers' ability to use certain services to commute to work or influence the local bus and train stops. Examples of changes like these are offering a train ticket refund or having more people on the bus by offering a free shuttle bus.

The second organizational factor is the influence of management. The supporting role of the management is essential to communicate the importance of the change, and it serves as an enabler to motivate and commits the rest of the workforce to the same goals. Actors in a managing position are an example to follow in a more sustainable way of working. Moreover, as shown in the research of Schwartz et al. (2010) and Jones et al. (2012), people in the organization that get support from higher management are more willing to act upon their responsibilities for environmental sustainability practices. In addition, leaders taking

responsibility for their environmental impact will be a source of inspiration to others in the workplace.

The last factor the organization itself can affect is the organizational culture. This is challenging, especially in an old and situated organization; the culture within an organization may be intangible. The only way to influence the behaviour through its culture is to communicate environmental impacts (Young et al., 2015). The prominent finding in this factor is how the environmental impact is communicated to its employees: communication concerns quality and frequency. One must be aware of the audience (Greene et al., 2014). In the research by Green et al. (2014), a toolkit is found on how to engage people in an organization's sustainability strategy.

Focussing on effective communication, they examine the following recommendations:

- Make sure that the communications are aligned to work together on the entire message;
- Focus on the employees' life at work;
- Be relevant, communicate current news and situations and consider the geographic locations.

Another problematic aspect of tackling an organization's culture is the underlying thoughts of employees. Cameron and Quinn (2006) appraise this issue as the 'taken-for-granted values' and incremental assumptions, expectations and past experiences with which people have negative associations when the organization also underwent a similar change.

External factors

Climate change developments and sustainability topics are daily news, which has consequences on political and economic levels. On the policy level, one sees that specific regulations and legislation are changing to force organizations towards a more sustainable business. Economically, the shift is made equally since organizations and society share the view to support only organizations and institutions that act to reduce the impact on the environment (Kölbel et al., 2020).

The consequences of external factors can be found in the different contexts the organizations found themselves. Operations or projects occur in specific areas where some environmental impacts are more prominent to tackle than others. An example is, for instance, the noise mitigation regulations in the offshore industry. Germany has strict guidelines for offshore work that must comply with 160 dB (BSH - Underwater sound, 2022). At the same time, other areas do not have this noise mitigation restriction. Another example of an external effect developed through the influences of changing policies and economies is carbon pricing. This system has been established by governmental institutions to combat carbon emissions to its half by 2050 (Wang et al., 2022). Governments initiate the carbon tax system to oblige organizations to pay for their pollution. It offers a level of demand and supply of carbon emissions, and the carbon market determines the price. Its goal is to reduce carbon emissions by forcing companies into less carbon-intensive operations; otherwise, the costs will rise because of the tax system.

These two examples of external factors driven by political and economic factors are of influence the way of working in an organization. It forces sustainable behaviour by avoiding high costs proportional to reducing carbon emissions and other penalties through causing an

undesired environmental impact. Thus, organizations and thus the workplace will act upon climate legislation to avoid conflicts with governmental institutions and limit costs.

Summary sustainable behaviour

In the previous sections of this chapter, multiple aspects of behaviour have been discussed. Factors are given that will be used in answering the research questions of this study. In addition, The research of Young et al. (2015) recommends involving employees in the strategy design process. Bringing the employees' perspectives into the formation will bring the barriers and motivators to light faster. This is an important aspect to consider while designing the desired intervention.

Further research on factors that influence one's behaviour at the workplace is found below. These factors came forward while reading through the articles and books written on sustainable behaviour at the workplace, in organizations or from the individual perspective. The following factors are worthwhile to consider in the area of research:

- The level of education. This comes in handy with the openness to learn new things and to adopt new strategies that propose the influence of innovations and future technological developments (Young et al., 2015).
- Other group factors such as the department one is situated, the floor, the building, the tasks assigned to a specific job, and even the site the employee or group of employees is situated in can influence one's behaviour.
- The culture within the organization toward employee pro-environmental behaviour determines the willingness of the employee (who is already pro-environmental) to behave sustainably. When an employee is willing to invest time into a sustainable solution, it is questioned whether there is any support from the organization. This can be a deal breaker for the employee and result in a lower rate of motivation and even job satisfaction.
- At last, other external factors could influence the sustainable behaviour of employees at the workplace. In other words, the influence of external factors outside the company, such as the appearance of newsflashes about extreme weather circumstances, have been proven to be the consequence of human impact on the environment (IPCC, 2022). This can also cause an intrinsic behavioural change in the individual to act and think more sustainably within their job responsibilities.

3.3 Sustainable management systems

Regarding the second research question, this section will illustrate the role of management systems within an organization in supporting sustainability:

1. It will discuss what a management system is.
2. An explanation is given on what kind of management systems may support and integrate sustainability.
3. A case study by George et al. (2016) addressed lessons learnt from an analysis of sustainability management within an oil and gas organization. Furthermore, a list of drivers, enablers, barriers and systematic factors of integrating sustainability into a company’s management systems is established.

Definition of management systems

Management systems are used to create a structure for how an organization should manage the interrelated parts of the business to achieve its objectives successfully (ISO, 2022). The larger

organizations get, the more different contexts to deal with, evolving into a more complex management system. This asks for structure and documentation on how the organization expects its employees to work to achieve its organizational objectives.

Nowadays, organizations are forced to apply a more sustainable way of working to limit their negative impact on the environment. Organizations worldwide try to find the proper procedures to manage their sustainability performance. A survey by McKinsey & Company has released results of their study that companies worldwide admit the sustainability challenge but lack in finding a way to manage engagement within the organization (Bonini et al., 2010). Therefore, managing the organization into a more sustainable strategy requires a review of the system's efficiency. Nonetheless, many management systems have been initiated that strengthen the process towards sustainability. Such as the ISO50001 and ISO14001, which have primarily been designed to tackle factors such as; electricity consumption and environmental conservation (Mustapha et al., 2016). However, tackling sustainability with only environmental management systems is considered sufficient. Others believe that a full scope of tackling sustainability challenges is only reached when integrated into existing management system standards throughout the organization (Nawaz & Koç, 2018). However, combining multiple sustainability factors into one management system has been problematic for organizations (Souza et al., 2017; Zeng et al., 2007; Mustapha et al., 2016). Challenges arise from complexity problems, low efficiency and higher costs to implement the proposed management structures. Integrating the systems designed for several factors into one management system could give a solution to a clear sustainable management strategy (Beckmerhagen et al., 2003; Silva et al., 2020). Not integrating multiple management systems within an organization with each other could lead to bureaucracy and will cause inefficiency throughout the chain (Silva et al., 2020).

Integrating management systems

Why incorporate a sustainable management system in your organization? With the outstanding questions on tackling the sustainability challenge, companies are at risk of not adapting their business towards their strategy correctly. However, it has been seen that the operational departments do not yet embrace sustainability. Besides the promotion of small sustainable initiatives are impulses that assist the strategy of short duration (Gianni et al., 2017; Silva et al., 2020). Sustainable initiatives are managed per initiative, with no clear guidelines, values or performance indicators as opposed to the company's strategy (Mustapha et al., 2017). To avoid this, finding a management system that fits with the organization's sustainability ambitions and way of working is paramount.

Knowing how sustainability is accomplished, monitored and managed so that you keep ahead of your competitors asks for a system that integrates multiple sustainability aspects from different management systems (Gianni et al., 2017). Putting together and taking into account several aspects is called the integration of management systems (Gianni et al., 2016). When correctly implemented, an Integrated Management System (IMS) will ameliorate the organization's performance and result in sustainable competitive advantages (Bernardo et al., 2017). Moreover, these advantages have made IMS the state-of-the-art system to approach sustainability (Silva et al., 2020). However, one needs to consider building upon the existing management system standards (MSS) in the organization to tackle sustainability challenges in their organization or to create an integrated MSS that tries to cover all actions necessary. In figure 10 you see the distinction made by Nawaz and Koç (2018) that illustrates the possible failures of using existing management systems.

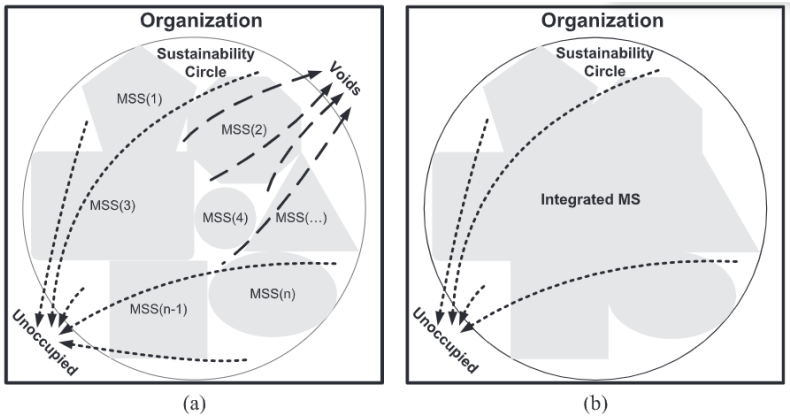

Figure 10. Having existing MSSs (a) against one integrated MS (b) (Nawaz & Koç, 2018).

In the context of the figure above, multiple separate MSS could end up in voids. In other words, the organization that has multiple separate MSS ends up with unforeseen consequences when projects, tasks or initiatives provided by environmental management collide. On the other hand, one has the integrated MS, which limits voids but also shows unoccupied areas. These unoccupied areas refer to the limiting scope of the existing systems within the company, e.g. having a short-term focus that excludes the application of new technologies. So it is encouraged by the research of Nawaz and Koç (2018) to create an MS that focuses on the sustainability performance of the company that integrates the suitable environmental MS to avoid voids and unoccupied areas (Jørgensen & Simonsen, 2002). Nawaz and Koç (2018) research evaluate several integrated sustainable management systems (SMS). First, they study the differences in principles of standalone or collected MSSs; after that, they analyse what requirements appear when sustainability is addressed in MS; lastly, they focus on assessing sustainability within an organization. Their study proposes a Sustainability Management System Framework (SMSF) (Appendix B). This framework highlights essential components of managing sustainability in any organization. Besides, it also discusses the difficulties of integrating sustainability in an organization, nor it proposes clear connections and pathways to manage sustainability systematically. The framework distinguishes six system elements; organization/decision maker (1), vision, scope and principles (2), criteria, risk assessment and objectives (3), sustainability initiatives for risk reduction (4), preparation and organization (5), and last implement, monitor & analyse (6). The reasoning behind the elements of the framework is explained briefly below.

1. A sustainability leader must not persuade the organization with its sustainable values and beliefs. The consequences of this behaviour could be that other people may feel less empowered or unwilling to contribute to those individually determined values. Visser (2013) lists the seven habits of influential sustainability leaders. See appendix C.
2. Within the SMSF, it is crucial to communicate the need to invest in a more sustainable business to the company. Moreover, creating a clear vision consisting of short and long-term goals is vital to enable actions to break down quickly.
3. Criteria, risk assessments and objectives are considered in this framework. It is stated that stakeholders and organizational decisions influence these. Therefore, the framework shows that stakeholders, tools that will help the company measure its performance and whether projects succeeded, are taken into account.

4. Bearing in mind that sustainability in the company should ensure a risk reduction is seen in applying a sustainability initiative in different contexts. Ensuring trust in the system is essential to avoid uncertainties, conflicts with other objectives, or other factors that may influence the achievements of sustainability initiatives.
5. To ensure a successful sustainable initiative, preparing and organizing the implementation plan is essential. This asks for managers that can make realistic and driving decisions.
6. Finally, the practical implementation of sustainable initiatives requires specific guidelines, effective communication, and internal policies. Overcoming these challenges adequately is by flexible monitoring and control.

Thus, examining the illustrated framework of Nawaz and Koç (2018), the focus is on organizational-level interventions to create a sustainable business. The framework established in their research is the outcome of what the authors meant by designing a different MS. The framework highlights the importance of involving stakeholders, ensuring transparency in the communication inside and beyond the company, flexibility, and organizing progress and appraisal of the system.

Organizational factors in management systems

The advantages of enabling a management system to move an organization forward are mostly focused on prioritising actions, and improvements, facilitating change, trying to align efforts for a more significant impact and spreading best practices (Blackburn, 2007). An organization willing to embrace a sustainable way of working may use MSS to increase its performance. Management standards bring consistency and direction to one's approach that will result in compliance and alignment, resulting in significant productivity and better results (Blackburn, 2007). In this last section on structural effects implemented by an organization to improve its sustainability performance, the focus is on minor changes within the system. From the work of Blackburn, roles that assure progress in sustainability and elements that are key within an organization are assigned. The table below finds the elements vital to a Sustainable Operating System (SOS). The SOS proposed by Blackburn will be used in this research as a checklist to determine whether certain elements are missing in a management system. The SOS is commonly used as a process by society and organizations toward achieving sustainability. Each element from this system can be paramount in succeeding in an organization and becoming more sustainable. An organization can achieve more support for sustainability via alternations or implementations of specific elements, drivers, efficient enablers, pathways and evaluators (figure 11). Further explanations on the meaning of the Drivers, Efficient Enablers, Pathway and Evaluators can be read in appendix A.

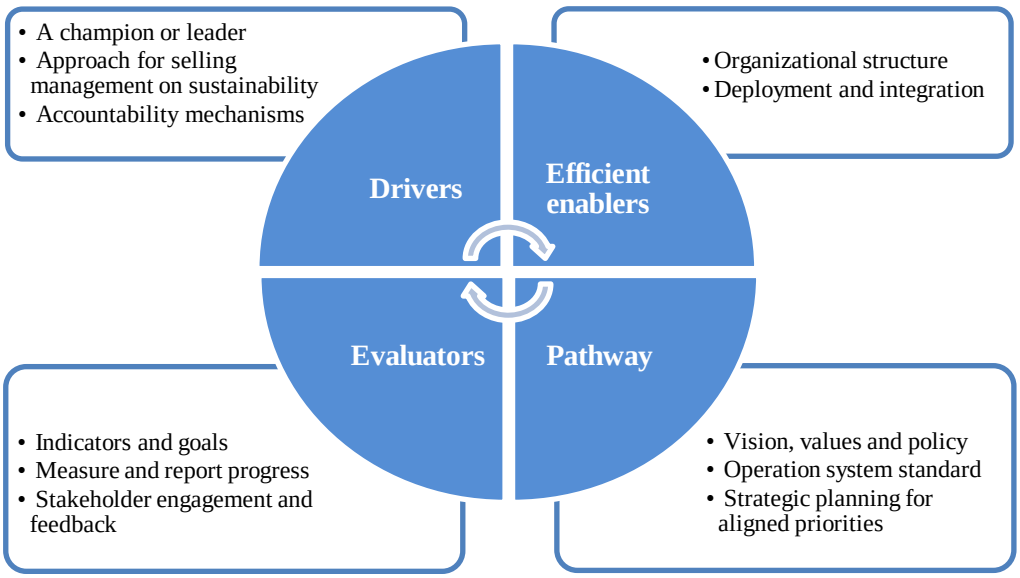

Figure 11. Assigned managing roles to key elements of sustainability within an organization. Adapted from Blackburn (2007) (own illustration).

In a study found on how sustainability integrates within the management system of an oil and gas company, the figure above (figure 11) highlights the key elements.

The study by George et al. (2016) performed a qualitative case study to determine barriers and enablers to implementing a more sustainable management system in an oil and gas company. This case study is chosen since this industry also faces the same challenges in incorporating sustainability in its businesses. So findings of the study may be of use to analyse a marine contracting organization's efforts to incorporate sustainability. The two foremost interesting questions this study addresses are; 'how sustainability was integrated into the key aspects of the performance management systems across the organization' and 'how the barriers and enablers of sustainability integration resulted in the organizations' specific path to sustainability integration' (George et al., 2016). Relevant findings on the two vital questions from that study are summarized in the table below.

Table 4. Enablers and barriers from the case study by George et al. (2016).

How to integrate sustainability in the management system	**Enabler of sustainability integration**	**Barrier of sustainability integration**
Technical integration	**Evaluation is key.** Ensure proper tools to assess the effectiveness of strategies and actions. Incorporate KPI's on sustainability per employee.	Organizational structures can withhold opportunities to flourish. No cross-departmental communication.
Organizational integration	**Rely on informal controls.** Involves hiring people with the right knowledge and experience to tackle the sustainability challenge. Or department restructuring.	No systematic performance evaluation and target setting processes.
Cognitive integration	**Quantify the environmental impact** which leads to more alignment with the environmental strategy. Give the organization the ability to measure, monitor, evaluate and achieve the sustainable strategy.	Lack of involving people and departments. Important role that finance plays which they are not aware of.

With this theory, it is essential to be aware of the continuous goal of the organizations, which is to improve businesses. Performance management will not only cover the sustainability integration within an organization. George et al. (2016) define sustainability's technical, organizational and cognitive integration aspects. As seen in table 3, the technical components of integration consider structural actions that will help measure your sustainability management, e.g. budgets, tools and structures and how processes should follow. The organizational components of integration focus on how to activate people towards more sustainability. It examines the organization's current processes, roles, and responsibilities to specific employees. The last integration component is the cognitive elements within an organization. This element considers how people think and behave within the organization. The cognitive integration element becomes apparent when one reviews the organization's objectives and facilitates discussions to share views or cognitions regarding the actual sustainability performance.

A thorough description of the company's pathway discussed in the paper by George et al. (2016) is found in the appendix. Table 3 summarises all the barriers and enablers of integrating sustainability by following their research's technical, organization and cognitive integration levels. To conclude, figure 13 illustrates the pathway toward integration (George et al., 2016). This assigns the importance of integrating all aspects to achieve a sound management system according to the company's strategy.

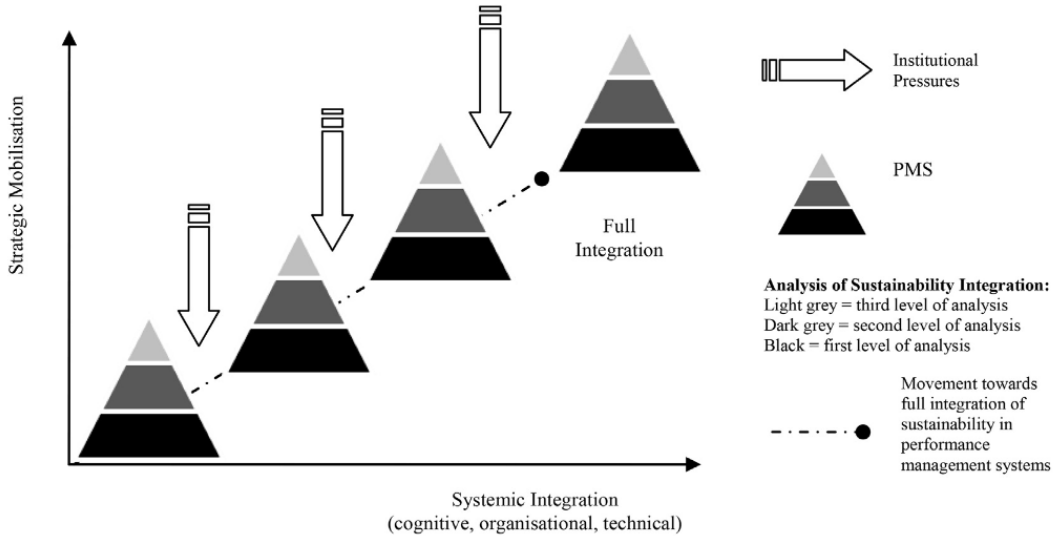

Figure 12. Illustration of the integration process described in the article of George et al. (2016). Combining all integration tools into one system will help improve the sustainability performance of an organization (George et al., 2016).

3.4 The environmental impact of a marine contractor

As already explained in the previous sections of this MSc thesis, sustainable development is the development that considers the three dimensions of impact; social, economic and environmental. It is about living life using the resources available on Earth so that future generations can also fulfil their needs (Filho et al., 2021). Sustainable development is also about finding the right balance between all three dimensions. Nevertheless, in the last couple of decades, it has been detected that the environmental dimension is stressed. This is seen in the climate action plan of the EU (Fit for 55, 2022) and the tangible effects of climate change manifesting itself through extreme weather events. In that view, regulations will be introduced shortly to force the industry and companies to put more effort into lowering their environmental impact, which is the cause of the changing climate. Therefore, this research will focus on the environmental impact one induces. More precisely, the impact a marine contracting organization has on the environment.

In the previous sections, it is assumed that performance indicators and measures on how to quantify environmental impact contribute to sustainability's cognitive and technical integration (George et al., 2016). Hence, this section examines the environmental impact indicators applicable to a marine contractor to build performance indicators to ensure action, measures, monitoring, and evaluation to stimulate and support a behavioural change.

Actions to reduce impact by a marine contractor

The activities of a marine contractor in general consist of engineering, procurement, construction, transportation, installation and decommissioning of structures offshore in the oil, gas and renewable energy industries (IMCA, 2022). Ensuring environmental sustainability in their work has become one of the focus points of the industry. Goodland defined the meaning of environmental sustainability in 1995. This definition of environmental sustainability explains that one tries to prevent the sources and sinks of raw materials on Earth will not exceed in time so that they will not cause harm to humankind (Goodland, 1995). This definition also highlights the economic framework of ‘limits to growth that considers the exhaustion of natural resources.

Moreover, this definition by Goodland (1995) also assigns the care of humankind as a driver of taking action on environmental sustainability. This research focusses on the environmental dimension taking the factors and consequences of economic and social dimensions into account.

In addition, focussing on dividing the environmental sustainability areas into strategic actions, the Organization for Economic Co-operation and Development (OECD) conceptualized the Environmental Strategy for the First Decade of 21st century (OECD, 2001). In this strategy, four criteria are defined:

1. Regeneration: focuses on the processes that renew, revitalize and restore the used sources of energy and materials;
2. Substitutability: considers the efficient use of non-renewable materials and the ability to substitute the used energy source with renewables;
3. Assimilation: considers the limit of the amount of polluting emissions and materials released into the atmosphere;
4. Avoiding irreversibility: this considers the alarming impact on the environment that is unable to reverse (OECD, 2001).

With the possible actions of the OECD to be considered in reducing the impact on the environment, the IMCA examines the environmental impact a marine contractor should consider (IMCA, 2022).

1. Greenhouse gases
2. Energy management and efficiency
3. Life below water
4. Circular economy, waste management and end-of-life assets

Taking the actions and indicators in mind, a marine contractor can evaluate its impact on the environment and determine whether to act upon its environmental impact in efforts to regenerate, substitute, assimilate or avoid irreversibility.

Environmental impact indicators

Indicators in this research are described to give the environmental impact seen in the marine contracting industry a specific rate of performance and importance. In that manner, the companies can be more specific in their focus on the projects and operations and have the ability to create feedback mechanisms in order to reflect upon the environmental performance. This is also necessary to manage a company's structure regarding those actions and to create incentives for employees to behave and work towards specific environmental indicators. However, not all indicators have defined a performance level on the amount of impact on the environment.

Environmental indicators that the IMCA considers to take care of, concerning the effects of climate change, by the marine contractor are seen in the figure below (figure 13).

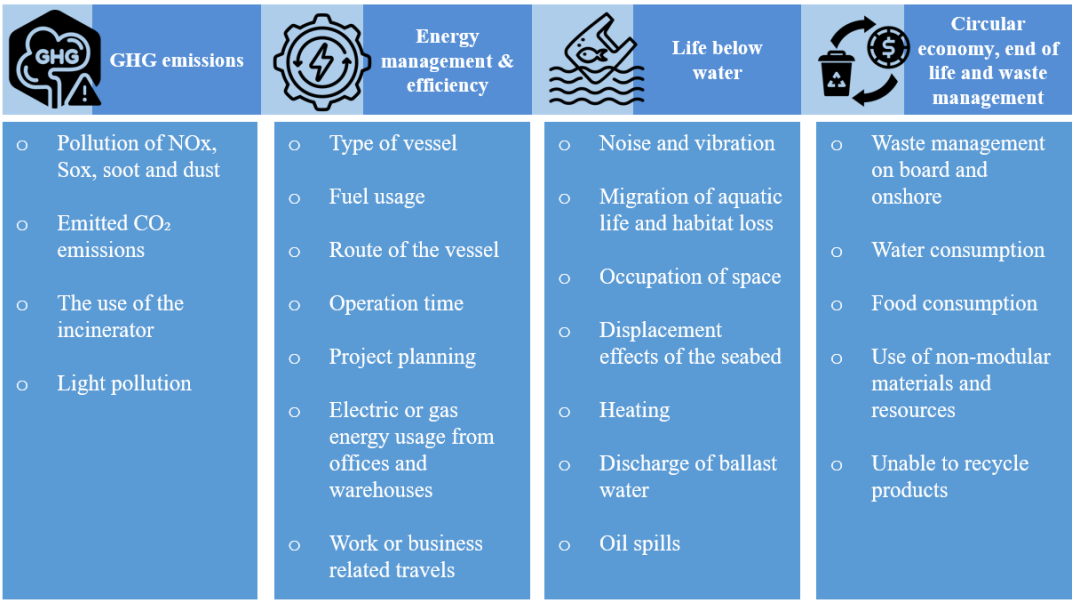

Figure 13. Environmental impact indicators considered for a marine contractor (own illustration). Sources: (Lee et al., 2019, Psaraftis, 2019; IMCA, 2022; HMC data, 2022 & Walker, 2016)

Of all of the above-mentioned impact indicators, marine contractors are developing techniques to track the performance of those impacts. For instance, through fuel consumption, one can calculate the amount of NOx, Sox and CO_2 concentration released into the atmosphere during operation by using emission factors (amount of GHG/kg fuel consumed).

However, it is hard for a marine contractor to calculate all the impact made per indicator per project. This because of the complex system in which projects are designed. Many sub-contractors perform work under the contract of the main contractor and one is not yet aware of the impact on the environment made by those activities. Bowen et al. (2011), assigns the complexity of carbon counting. The research oversees that policy is needed to ensure a clear structure on accounting carbon emissions to organizations. Moreover, they highlight the occurring tensions between accuracy, consistency and certainty on effects on the environment and who is responsible.

Different scopes of emissions

The scope of the environmental impact of a marine contracting organization goes beyond the operations executed through the use of their vessels. As seen in figure 13, one should also tackle the emissions from generating energy in the company facilities and business travel. The complexity considers reporting all the emissions concerning the total environmental impact because of the emissions from upstream and downstream activities. These are indirect emissions where the company has no direct influence via reduction or prevention measures. Tackling these indirect carbon emissions raises questions, and measuring them is difficult. The global greenhouse gas protocol distinguishes these indirect emissions into scope 2 and 3 categories (Hertwich et al., 2018). Scope 2 considers the purchase of energy for the company's use, and scope 3 considers a wide variety of upstream and downstream activities by the company. Examples of scope 3 emissions are the emissions caused by the waste management facilities, employee commuting, transportation and distribution of the assets or the emissions caused by the end-of-life treatment of sold products.

It is essential to consider where emissions come from to take action. To add, tackling scope 3 emissions may ask to elaborate with suppliers or other stakeholders in the value chain to align sustainability ambitions. However, it is a start to report all emissions and consider them in the company's sustainability strategy.

Industry broad challenges in tackling environmental impact

Given all environmental impact indicators (see figure 13) and the previous paragraph, an organization must ensure a strategy to retrieve results in lowering its impact on an indicator. Accountability and consistency in the industry on counting emissions is still missing (Bowen et al., 2011). In addition, making a positive impact on an environmental indicator is not easy, and the tools to measure and monitor impact are developing (Koilo, 2019). There lies a trade-off for companies to invest in technologies that reduce the impact on the environment and be less price competitive or competitive by keeping prices low and having the same impact. On top of that, sustainable technologies and innovations are not yet state-of-the-art, resulting in a loss for the company (Koilo, 2019). Other challenges in finding the right (technological) investments and actions to reduce the environmental impact are location-dependent operations, the industry operating worldwide, and measuring impact is location-dependent. Besides, proper reporting has not yet been aligned on a broad industry level, which causes uncertainties (Lee et al., 2019).

3.5 Conclusions on the literature review

This chapter aims to determine which elements and factors need to be considered when an organization wants to incorporate sustainable behaviour within the project scope. This has been done through reviewing and analysing literature found in the field of research. The chapter is built upon three key elements to consider in this study. This section will summarise and highlights the essential findings of each section.

The first section illustrates the variables of sustainable behaviour from a customer point of view, an employee point of view and from the manager's role. All views conclude that by influencing people's behaviour one should distinguish values and personal traits (Marcus & Roy, 2017). Moreover, beliefs and behaviour patterns (TPB) show how individuals differ in their motivations towards adopting sustainability in their work (Silvius & Schipper, 2012). This difference addresses an organization's challenge when implementing a new strategy. When adopting a new sustainable strategy, getting everyone involved is complex and ensures employees will do their best to perform more sustainably.
Furthermore, the analysis of Silvius and Schipper (2012) helps distinguish behaviour patterns within project teams to ensure the right approach to initiating sustainable actions. Besides, factors of sustainable behaviour at the workplace are evaluated on; individual, group, organizational and external levels. Regarding the different levels, the individual level should be the main focus. Influencing sustainable behaviour on an individual level should ensure a more prolonged impact because of the psychological and cognitive factors (Young et al., 2015).

The second section elaborates on how organizations should manage sustainability within their business. A business should create an integrated system that will be spread throughout the organization that shows how current processes are influenced by the sustainable ambitions and targets of the company. Furthermore, there is an overlap between the framework of Nawaz and Koç (2018) and the six critical elements of managing sustainability of Blackburn (2007). Both highlight essential aspects to incorporate in a sustainable management system to drive sustainable behavioural changes. To conclude, the article by George et al. (2016) evaluates a valuable case study on implementing a sustainable management system in an oil and gas company. Their research highlights the importance of considering technical, cognitive and organizational integration along the pathway toward a sustainable management system. To conclude, through analysing their case study, enablers and barriers were discovered that are helpful to evaluate in the scope of this research.

The last section of the literature review elaborates on the environmental impact and indicators a marine contractor is accounted for in line with the IMCA environmental impact code of practice. The operations of a marine contractor go beyond borders, making it hard to define general performance indicators upon the environmental impact of the organizations. Additionally, industry policies should be introduced to measure impacts and determine what impact is assigned to whom in the operations. Nevertheless, this section introduces the environmental impact of a marine contractor, and it gives a glimpse of how marine contractors can take action upon the impact.

To conclude, the literature review findings have ensured a basis of knowledge for this research. Regarding the DSR approach, rigor has been achieved since relevant theories and frameworks are found that help analyse the behaviour of employees in the organization. The insight from the state-of-the-art literature provides a basis for influencing sustainable behaviour in line with

environmental impact indicators in a marine contracting organization, which can be completed using insights from HMC on current behaviour and tackling sustainability.

Key takeaways from chapter 3

- Sustainable behaviour at the workplace is seen as the ability of employees to take care of the environment in their decision-making.
- A personal approach to influencing the behaviour of employees tends to be the most effective.
- Be aware that a project team consists of different behavioural patterns that respond differently to changes within the business strategy.
- Behaviour stimulation is founded by influencing personality traits and values; this can be done by making one aware of the possible environmental impact of projects.

- Integrating management systems are essential to ensure that employees think of sustainability in different departments.
- Integrating systems, technical, cognitive and organizational aspects are useful to distinguish barriers and enablers for sustainable management.
- Key elements that support sustainable behaviour within an organization are leaders, clear communications, aligned objectives, ensure trust to avoid uncertainties, strict organization of the implementation and guidelines on how to cope with sustainable initiatives.

- Environmental impact indicators that a marine contractor must focus on are GHG emissions, energy management and efficiency, life below water and circular economy, end of life and waste management.
- Complexity of projects make it hard to determine an industry wide performance measure for sustainability and environmental impact.
- A marine contractor must get a hold on its total environmental footprint to cover its total sustainability performance. However, including scope 1, 2 and 3 in a company's sustainability strategy is complex.

CASE STUDY AND INTERVIEWS

The objective of this study is to analyse how an organization can support and stimulate its employees towards sustainable behaviour within project scope. For this, insights from current behaviour at the workplace and what processes could stimulate and support sustainable thinking, interviews and explorative data are retrieved from Heerema Marine Contractors (HMC). This chapter will analyse the company and project on its current status regarding sustainability and behaviour of the employees. The results of the interviews are presented through a comprehensive summary of the analysis carried out.

Likewise, this chapter aims to answer the sub-research question:

'How should environmental performance indicators be taken into account to stimulate and support sustainable behaviour within project scope in a marine contracting organization?'

4.1 The case study at Heerema Marine Contractors

As mentioned earlier, this research retrieves real-world insights from Heerema Marine Contractors (HMC). HMC started as a constructor in 1948 when the company placed their first structure in Lake Maracaibo, Venezuela. In less than ten years, the company installed hundreds of drilling and construction platforms in that area and many concrete piers, quays and bridges (HMC data, 2022). With the upcoming oil and gas sector, the company specified its fleet into the challenging market of installing oil and gas platforms at sea. This could only be done with crane vessels that were able to carry heavy lift structures. Therefore, in 1978 the company commissioned the world's first semi-submersible crane vessels, Balder and Hermod. These vessels have been a game changer in the operations at sea; projects were executed within weeks instead of working a whole summer to complete the offshore structure installation. After this development, the company grew further into this niche heavy lift transport and installation market. Nowadays, the company owns four crane vessels and two tugs to execute its projects. The last crane vessel that was added to the collection of HMC is the Sleipnir. The world's largest crane vessel consists of two cranes carrying 10.000 tonnes each (HMC data, 2022).

Company structure

HMC, a family-owned business, is split up into three companies. Respectively, Heerema Marine Contractors (HMC), Heerema Fabrication Group (HFG) and Heerema Engineering Solutions (HES). They all operate under the non-executive board, Heerema Group. The board of Heerema Marine Contractors takes responsibility for the daily management tasks. The organizational structure was just renewed during this thesis's research period and can be seen in appendix I. The main changes in this organizational structure are seen in the reporting lines of work to the board level. Besides, HFG and HES report directly to the board. Moreover, a focus is initiated by introducing new board positions: the Chief Operations Officer, Chief Commercial Officer, and the Chief Human Resource Officer.

Organization

The main focus of the organization is to execute operations offshore. These operations range from transport, installation, and decommissioning of structures offshore to the relatively new wind market operations: installing monopiles, jackets or gravity-based structures for wind turbines. Many other business units are enabled to support these main activities of the company, as seen in the organizational structure (Appendix I). The organization uses management system documentation to collect all management procedures designed per department. Besides, work instructions are shared that concern how people should work

according to the company's guidelines. For example, using the HMC integrated risk matrix or social media guidelines. The internal documentation on management, HMC also incorporates external codes and standards in their organization. These consist of ISO standards and other country-specific external codes that mainly cover restrictions and legislation. The ISO codes concerning environmental impact and energy management, respectively, ISO14000 and 50001, of which HMC has not yet adopted the latter.

Tackling sustainability as a marine contractor

Studying the historical development of the company, it is seen that HMC invests in new technologies to be the leading marine contractor and acknowledges that their clients also ask for more sustainable project execution. This is also seen in the sustainability ambitions and roadmap, which align with the European Union's climate ambitions. Considering that two of the three sustainable ambitions of HMC include the environmental impact, it underlines again the need to address this impact dimension (see figure 14).

Figure 14. Sustainability Roadmap of Heerema Marine Contractors (HMC data, 2022)

Over more than ten years since HMC started addressing sustainability within its business, the company stands in their sustainability challenge. In 2011 the first sustainability report was established, including the announcement of assigning more formalized management systems for environment and health and having these ISO 14001 certified. Moreover, the report focuses on Safety, Health and Environment performance. Also, this report highlights the CO_2 footprint of the company. Each following year, another sustainability aspect is described in the report; how the waste is handled responsibly (HMC Sustainability report 2012), another aspect that comes forward is the need for sustainability using; 'Sustainability premises, sustainability beliefs, sustainability involves everyone' (HMC Sustainability report 2015). Additionally, the report poses the achievements in sustainability and the sustainable plans to build a new vessel and invest in carbon-neutral activities and shore power HMC Sustainability report 2017 & 2018). Over the years, health and safety have been monitored through performance indicators, incidents and working circumstances on board.

Nowadays, the company measures the environmental impact by multiplying the vessels' fuel consumption with the emission factor of CO_2-eq. Furthermore, the company can track down the emissions coming from purchased electrical and gas energy used in the facilities of the company and track down emissions caused by business travel.

In the last couple of years, sustainability has become more important to the industry and HMC. The IMCA even set up an environmental impact committee to support its members in improving environmental performance and ensure the transition to a low-carbon and climate-resilient industry (IMCA - International Marine Contractors Association, 2022). In the figure below, important events that have ensured the current position of sustainability within HMC are illustrated (figure 13).

From 2020 onwards, the carbon emissions will be neutralized via offsetting the carbon emissions in collaboration with the Climate Neutral Group (HMC climate neutral, 2022). This means that the impact measured (fuel consumption, purchased energy and business travel) is fully compensated. Besides, the company has put a Sustainability department in place to work full time on making a positive impact. This department plays a role in supporting all other departments through answering their questions considering sustainability and helps to explain its sustainability performances and ambitions to clients. To add, the department explores improvements for the organization to increase its performance on sustainability.
To add, the HMC Sustainability strategy and reduction targets are audited by external parties.

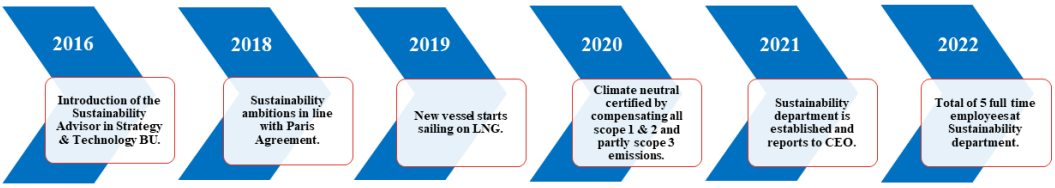

Figure 15. Important organizational actions from the last few years that have been important to incorporate sustainability in the organization (own illustration).

Auditing is done to ensure that what HMC strives for in its ambitions is in line with the existing targets and frameworks from the UN and EU.

Figure 16. All frameworks and organizations that set targets in order to act upon sustainability in a certain amount of time that HMC includes in its roadmap (HMC, 2022).

The ultimate goal of HMC is to ensure that everyone, whether off- or onshore, can consider sustainable values in their decision-making and measure progress in their actions. The projects within the sustainability roadmap (figure 12) align with the triple bottom-line pillars of sustainable development in which an optimal balance is preferred. Stimulating activities and projects that sustain any pillar and an SDG help the company to reach its mission statement. However, the focus is to improve the performance in reducing their environmental impact. This is also highlighted by the IMCA which created the Recommended Code of Practice on Environmental Sustainability in 2021.

To conclude, analysing the current way of how the company assess sustainability, there is space for improvement. The projects the organization initiates to reduce, prevent and

compensate for the environmental impact it makes are not tangible for the employees to see their contribution. In that way, the company is not using the valuable knowledge that people can add to tackling environmental challenges. One should consider how personal contributions can be made more accessible to encourage people to contribute to the company's mission statement. This is in order to create a feeling of contribution toward the company's sustainability challenge.

4.2 The project

From the company explanation, the current status of sustainability within the company and activities regarding sustainability, the focus of this research is on supporting and stimulating sustainable behaviour within the project scope to lower environmental impact. The following section will elaborate on how a project is structured and managed throughout the design phase.

In this research regarding how sustainable behaviour can be stimulated and supported, a focus group to retrieve information via interviews and conversations has been chosen. The decision to focus on one specific group is elaborated in section 4.3.1. Here, the context of the He-Dreiht project is found, and the argumentation whether this project was used to explore sustainable behaviour from a marine contractor perspective.

Context of the He-Dreiht

The He-Dreiht project will be executed in the German North-Sea, located 130 km from the marshalling yard, Eemshaven in the Netherlands. Further field conditions taken into consideration are that the soil has a soft top layer of around 2.5m and that the water depth in the area reaches from 38.1 up to 40.5 m LAT. The project will install 64 15MW wind turbines which will be good for a 900 MW grid. HMC has been assigned as the marine contractor of this project which involves: transport and install 64 monopiles and transition pieces with the help of a template and noise mitigation systems, the levelling and grouting of the transition pieces, ensuring of the scour protection around the monopiles and execute the inspections upon completion. The vessel that will be used for this operation to lift and install the monopiles and transition pieces is the Thialf. The client conversations started in August 2021 and the tender was rewarded to HMC at the end of April. The operation at sea will start in April 2024.

Figure 17. Image from simulation on how HMC will install the monopiles using a new designed template (HMC data, 2022).

Figure 18. Thialf on the way (HMC data, 2022)

Project design and process

Before HMC was rewarded with this project, the tender phase had to be concluded. During the tender phase, an assigned tender team of HMC from the commercial department was involved in the project's design. During this period, this team is responsible for establishing a proposal to fulfil the project to the client, which is called a Best and Final Offer (BAFO).In this tender team, which consisted of commercial managers and tender managers, the focus was to fulfil client needs for project execution, cope with regulations and EU tender law (more strict procedures on communicating with the client), secure financing and structure the timeline of the project. Other external factors that the project team had to cope with were the steel inflation and the change from a client-driven perspective to a contractor-driven perspective. Another difficulty of this project is the new applied methodologies and techniques to execute the project. Model testing and new knowledge had to be sought externally for estimations on the project execution.

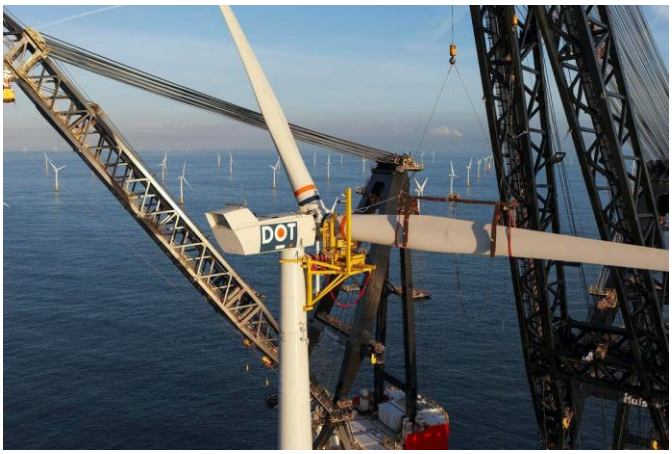

Figure 19. HMC has experience with installing monopiles. DOT is an example of a project where new engineering solutions were used for installation (HMC data, 2022)

The He-Dreiht project is one of the largest planned offshore wind power projects in Europe, involving the biggest wind turbines currently available. The larger these turbines get, the bigger and heavier the structures are to keep them in place. Therefore this project shows that the wind energy market is looking for experienced companies that can transport and install these heavy structures. For HMC, which originates from the transport and installation of oil and gas platforms, this market change and the need to contribute to the energy transition has ensured a separate business unit focussed on the wind market. The contribution of HMC to deliver projects that support the energy transition is essential for the company, aiming to create sustainable values for client(s) and stakeholders. In addition, it is seen that these new clients more often ask for sustainable methods than before. Therefore, the employees working on these projects are challenged in their engineering work to design more sustainable solutions. However, the company is not yet able to manage and measure the sustainability performance of particular projects. Thus, exploring this within one of the projects that drive the energy transition is valuable to retrieve future-proof insights.

Moreover, the context of this project withholds that one needs to consider several factors of influence. The first factors to deal with are the significant number of stakeholders. The most paramount in this scope is, the client and project owner, EnBW, one of the biggest energy providers in Germany. Besides this vital stakeholder, many others are involved in the project, which makes this operation quite complex. The other stakeholders that are responsible for smaller tasks in the project delivery are called subcontractors. An example of such a sub-contractor is the chartering service in the yard or the supplier of the monopiles. All must be aligned with how HMC will design and execute the project. This complexity also plays a role in achieving sustainability ambitions for this project. Stakeholders provide requirements or guidelines to execute the project work in a certain way. Nevertheless, it can also get in the way

when HMC has specific needs to perform processes differently to increase its sustainable performance. Therefore, coping with the influence of all stakeholders within this project has been a challenge for the marine contractor.
Another factor that plays a role in the context of this project is the environmental legislation applicable to the area. The BSH, the German authority that tests, approves and monitors wind structures at sea, has set strict rules regarding the noise produced by offshore project execution that causes harm to marine life.

Furthermore, the factor that plays a role is the availability of material, technology and resources to execute the project. Within this project, the installation will be done with the Thialf, an HMC-owned vessel. The template that is used to install the monopiles is specially designed and built for this project because of the large diameter of the monopiles. This brings challenges because people will need to work with a new template and hammer to install monopiles which has not been done before.

To sum up, the He-Dreiht project has been chosen as a case study on sustainable behaviour because of the engaging, complex environment, the aim to execute the project sustainably and taking the prosperities of the wind industry into account, which will play a vital role in the future business of the HMC.

4.3 Conclusions on the case study analysis

HMC shows effort in improving its sustainability and environmental performance. It has been climate neutral since 2020 and has installed a CEO reporting department which covers five full-time workers that work on the company's performance. Besides, it has designed the largest crane vessel in the world that can sail on LNG. By implementing the business unit wind, they highlight their willingness to contribute to the installation and transport of wind farms that facilitate the energy transition. Nevertheless, executing this in a more environmentally friendly way is still a hurdle. The projects executed by the company need to withstand the clients' requirements and follow the area's rules and regulations to sustainably design the project in line with the ambitions and targets of the company.

Nevertheless, given the literature on how sustainability can be successfully managed in organizations (section 2.3), some points are found in which the organization can improve. From a broad organizational view, no integrated management system can be used to manage its environmental impact. The company assigns the use of ISO management systems; however these are too abstract to be used during project work. Besides, integrating a management system that covers all the environmental indicators will ensure structure, assigns responsibility and is more efficient (Silva et al., 2020). Besides, implementing an integrated sustainable management system will ensure that the new way of working will be deployed in existing tools, processes, procedures, programs and values (Blackburn, 2007).

Moreover, no tracking mechanism is yet implemented to track the total sustainability performance of projects. The projects cannot track their performance regarding the assigned environmental impact indicators a marine contractor has to cope with (IMCA, 2022). This makes it hard for project managers to manage and measure the projects' impact and make decisions towards a more sustainable design. In addition, a tracking system will motivate other employees to put effort into sustainable actions because then they can see their actions' impact. A performance system is also helpful to account for specific departments or projects for their caused impacts so that the company knows where to assign importance (Blackburn, 2007).

By reflecting on the aspects found in the organization that support a sustainable management system with the framework of Nawaz and Koç (2018) HMC considers most of the framework's elements. The two elements HMC can put more effort into are the appearance of environmental aspects in the risk assessments and communication. Considering the first element,
HMC focuses on minimizing risks during its operations. Making sustainability part of that risk assessment will make one more aware of the impact of not-performing sustainably can pose risks for the company; it can damage the reputation or result in hefty fines or, even worse, project cancellation. Communication in this view is also essential; communicating the need to change the way of doing business can be done more effectively through multiple channels. Besides, the company can assign managers to opt for the topic in meetings and communicate clear short and long-term visions (Nawaz & Koç, 2018). The latter is also important to make one aware of the pathway towards sustainability (Blackburn, 2007). This can help steer employees individually towards a more sustainable way of working.

To conclude, the efforts by the general manager of sustainability are seen as a driver, distinguished by the key elements of managing sustainability in organizations by the research of Blackburn (2007). The manager tries to inspire people to think of the sustainability aspects the company has to deal with. Moreover, making efforts through presentations and events keeps the company and its employees moving forward to achieve its targets and ambitions. However, the turnout for these presentations remains relatively low.
Conclusions on the case study analysis of the company and how projects are structured are important to consider in this research's design and demonstration phases. In that view, one should consider how the intervention will be rolled out in the organization to ensure success and achieve its goals.

4.4 Overview of codes and themes

The explorative interviews have been conducted to gather input for the to-be-designed intervention that will stimulate and support sustainable behaviour in a marine contracting organization. Atlas.ti is used to distal all data from the nine interviews conducted. All transcripts are analysed with the use of 5 themes and 13 codes.

The coding was determined inductively after all interviews were conducted, additional codes were added throughout the coding process, and iterations were made to the codes. The figure below (figure 20) a network diagram shows the relationship between the codes used in the coding process in Atlas.ti. Some codes overlap in and between specific themes, which is indicated by the dotted lines.

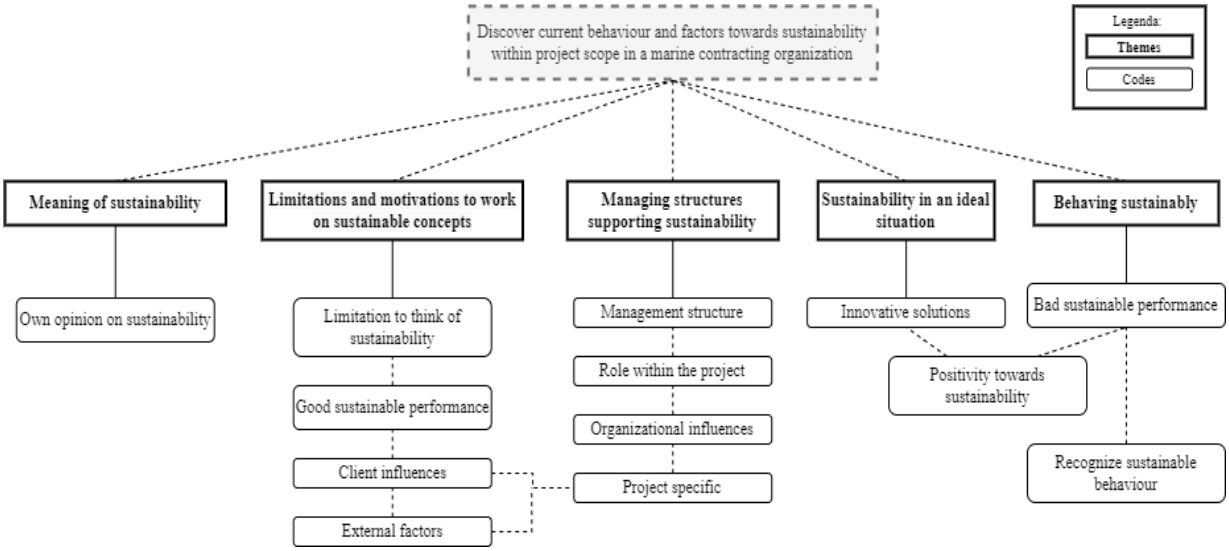

Figure 20. Network diagram of codes and themes used in Atlas.ti (own illustration).

4.5 Results from interviews

The outcome of the Atlas.ti analyses are elaborated below. The output is a list of factors influencing sustainable behaviour within HMC and indicators of how an intervention could create awareness of the environmental impact of projects. The results are summarized regarding the following 5 themes: the definition of sustainability according to the employees [1], the factors that stimulate or demotivate one to add sustainable concepts within their work and projects [2], the managing structure of the project [3], the ideal situation to the employee on how they would like to assess sustainability [4], already analysed sustainable behaviour and actions [5].

[1] The definition of sustainability

Overall, all interviewees came up with a broad definition of sustainability. Most answers considered that one should leave the planet as a place how we have found it as a generation in order to give future generations the same options (I.2; I.5; I.6). This, through minimizing the number of resources used and also by having a positive impact on the environment through contributing in the energy transition as a marine contractor. Many interviewees place the problem in the bigger picture, which makes it hard to define the specific meaning of sustainability since it touches upon so many different aspects (I.2; I.3; I.4; I.8). People recall the importance of the social, economic and environmental aspects of sustainability but also

admit that this triple bottom line, is out of balance. Through overall broad definitions, one may conclude that the people within the organization are well aware of the sustainability topic in society. Some employees give several actions to be more sustainable as a marine contractor, for instance, fuel usage, the steel used in projects, or other optimised procedures to fasten operations with the vessel to limit the number of operation days. Other people pinpoint the individual perspective on the definition of sustainability (I.3; I.5; I.8), that it is different for some, depending on their work environment or sphere of influence within projects. To conclude, when the definition of sustainability is considered, the challenge for a marine contractor, to act more sustainably in its projects should involve a great portion of confidence to stand out from the crowd and make a difference (I.5; I.9). This in consideration of the clients' demands on how projects should be executed under what circumstances taking care of the environment and human being while pending on a certain price tag from the marine contractor (I.9).

From the input on the definition of sustainability, one can conclude that the meaning of sustainability is not very specific to all employees. One suggests several meanings and sometimes admits that it is different per person. One rates specific aspects or conditions covering sustainability from the triple bottom line differently than others, making it hard to get on common grounds when one has not yet shared the definitions of what they think sustainability means to them.

[2] Limitations and motivations to work on sustainable concepts

To start, the main limitation of the employees of HMC to think of or work on sustainable solutions or actions is time. Because of the great amount of work that needs to be executed in less than two years from now, people do not know where to find the right time to adopt a sustainable viewpoint to the project work (I.2; I.4; I.8). On top of that, the lack of a common internal deliverable focussing on a specific sustainability indicator is missing (I.9). Moreover, the other factor that limits to incorporate sustainability easier is that the technology is not ready yet, one relies on a state-of-the-art process which is secure and tested in previous projects (I.5). And if testing is required, it costs time and money which is not always included in the budget of the client (I.5; I.6). This client can form a hurdle as well, since the contractor is on the hire of the client, where this relation can sometimes be hierarchal instead of acting together in order to make the project installation, transportation, or removal more sustainable. I.4 - when asked what was holding them back from thinking about more sustainable solutions in their work packages, it was - *"Time. A project within Heerema is challenging. I mean, a lot of documentation, many logistics. We need to engineer; we need to procure items. For example, we will build a template of 200.500 tonnes steel and mechanics. We only have two years, and this is the first time with the new template. So it is something new. We need to do research"*. This quote also refers to a more often called limitation that the team is small and does not have all the proper knowledge on sustainable technologies that could make a difference in projects (I.2; I.3). What is positive to analyse is that multiple employees name examples of actions to search for this expertise outside the organization (I.5; I.6; I.8). Through collaborations with suppliers of batteries that could be installed on board of the vessel or other sub-contractors that are part of the project.

The last limitation on how employees look at their motivation to consider sustainable aspects of the project is the limited impact they oversee to make (I.1; I.3). One questions their contribution since there are strict guidelines on how the projects are executed, limitations from the client's side as well as governmental regulations that limit creative thinking (I.2; I.3; I7).

With that, they may feel powerless and unable to contribute to the project being executed, taking special care of the environment by reducing the impact. Nonetheless, when there is a good idea, a lot is possible. Clients and people from within the company will hear the idea and determine whether it can be useful.

To finish, employees also named motivations to consider sustainability aspects within their work and project packages. They see sustainability investments by HMC, such as shore power at the Calandkanaal and the possibility to sail on LNG on the Sleipnir as vital motivations and actions of the company to perform accordingly by creating sustainable values (I.6; I.7; I.8). It gives the employees the option to show to its clients, sub-contractors and other stakeholders that the company is working, with own initiatives to reduce its impact on the environment (I.9). Additionally, to be competitive in the market one also sees sustainable solutions as something to differentiate from competitors, that may result in more tenders to be awarded to HMC (I.1; I.5; I.9). With that, employees are more motivated to work towards a better sustainable performance knowing it will generate more projects to the company.

Another factor that motivates the interviewed employees is the business unit the employees work in. To work on engineering projects that ensure the installation of wind turbines gives them a feeling of sustainable contribution already (I.2; I.6). This business unit, with new clients to work with asks for a different focus and gives priority to emission-free companies or new technological solutions so in that sense it is promoted to think of sustainable solutions within the project (I.9). Thinking of new solutions in this market segment stimulates employees also to retrieve new insights from its performances. One of the digital breakthroughs here that the interviewees mentioned is the ability to track your daily carbon emissions during the project (I.6; I.8; I.9). It motivates employees to work or think of sustainable solutions while they can get specific actions and numbers to act upon (I.6).

[3] Managing structures support sustainability

Within the He-Dreiht project, there is a core project team established of eight persons. With three project engineers, three installation engineers and two or three project managers (I.9). With this team, there is a minimum of two hours per week to meet and discuss progress. Moreover, this project team also has client meetings that take up to two hours weekly (I.9). Furthermore, there are all kinds of technical breakout sessions to discuss the multiple engineering packages, sub-contractors assigned to the project or other technical difficulties, such as equipment used, the marine context during operation or technological restrictions stated by legislations. Those meetings are prepared by an assigned team member, most of the time a project engineer, that will keep up with the time and calendar (I.4). When asked whether sustainability was part of those meetings, the answer was no (I.2; I.3; I.4; I.6; I.8). It is analysed that sustainability is not on the agenda of the project. However, there are engineering concepts that also address sustainability. For instance, it is possible to not have an extra vessel operating the bubble curtain that causes massive emissions through its nearly 30 compressors on board. Instead of this, the engineers are looking into the possibility of having the compressors on board Thialf and let it run on batteries; this will reduce the air pollution on deck (I.1; I.3; I.8). Nevertheless, this incentive comes from a financial point of view, e.g. the costs of an extra vessel working on the project are high (I.8). On the other hand, one also sees that the market is changing and that suppliers ask whether HMC is working on its projects according to comply with the SDG's or UN climate goals (I.9).

Sustainability is not placed as a separate point on the project calendar. When asked who should be responsible for putting it on the agenda, most of the people assumed it should come from higher up in the project nor the sustainability department (I.2; I.5). Project managers should fulfil this role of initiating sustainable ideas or creating the time to think of sustainable values or environmental indicators found in the project. This is also identified as a top-down approach that would set people towards sustainable thinking. One of the interviewees assumed that a bottom-up approach would entail a more significant change in promoting sustainable behaviour in the organization.

Furthermore, aligning and communicating a clear management structure would also help employees. Roles and responsibilities can be communicated more strict (I.2; I.3; I.4). A few interviewees did not know who is responsible for what part of the project. It has been experienced that it is hard to find the right person to sign off on something one is involved in. This can also be forwarded to tracking performance and taking ownership of that performance. At the beginning of a project cycle, responsibilities and engineering packages are divided among team members, which is done strictly. Moreover, during project design, many more employees will be asked to help to retrieve specific engineering knowledge or expertise on a particular topic. However, sustainability is not mentioned in this list of responsibilities or assigned tasks. On the other side, when one sees improvement or significant developments in certain things, one can put it to the discussion and calendar. Support from the project manager and a joint effort in weighing off the pros and cons will then lead to a decision-making process. An important question that drives the project investment list follows from the quote, I.5 – *''No one here thinks that sustainability is a bad idea, but it is always the question, what is the impact? Yes, commercially?''*. Here one suggests the incentive on what base project decisions are made and the drivers of these decisions. It has come forward that many decisions made in the company are from a financial point of view which can withhold some opportunities to becoming a sustainable marine contractor. E.g. clients who are not willing to pay for LNG when it is offered to them by HMC because of the higher costs, or consuming less fuel by sailing slower or having one extra operation day that costs nearly 1 million euros (HMC data, 2022).

The last aspect to consider when new solutions are designed to save fuel, a vessel or ensure one of the other requirements on a project sustainability-related, some decisions are that big that they must be presented to the board (I.5). Investing in new technological equipment just for one project must have come from a grounded decision that will not interfere with the status of the company (I.3). Some projects ask for an investment in new equipment that must be built on a profound business case. But often, the timing of the project is short of making those more significant decisions for just one project. Therefore, some decisions that are project related are not only made by the project team. It must be considered by the board to estimate whether the investment is worth enough and what it would mean for the future perspective or projects to ensure its return on investment.

Nonetheless, the managing structure of the He-Dreiht project is built on different design packages and knowledge. People would not mind having one less parameter on the scoreboard (I.2), and whether ideas start to get more complex or vague, less support will be given (I.1).

[4] Sustainability in an ideal situation

This topic was addressed in the last part of the interview. The question was focused on how people would assess sustainability within their work in an ideal situation, focusing on time,

how to be informed, and what tools to use. Most people saw the essence of tracking performance as a motivation to work towards a particular environmental indicator. Set clear goals in the project on what aspects they are aiming to score (I.9). Others also mention the long duration of a technological breakthrough in the industry, projects are time driven and to get towards the moment that state-of-the-art technology can be replaced, by a more sustainable innovation, takes time (I.1; I.3; I.4; I.6). Therefore in an ideal situation, technological developments should be secured faster. One also oversees the digital transformation to collect more data on the company's sustainability performance (I.6). Most are focused on tracking and measuring performances via interactive dashboards fuelled with data from the daily progress report, waste reports, or the steel marketplace. These collections of data and their insights will positively affect the way employees look at those indicators since the performance is seen by the organization (I.6; I.9). It has been said that when things are tracked and written down, it could become an internal deliverable with clear actions that can contribute to improving current processes (I.2; I.6; I.9).

Other interviewees mentioned the ability to create time within the project planning to think of sustainability while thinking of assessing sustainability in an ideal situation. Time to pose each other questions on what environmental indicators can be found, have brainstorming sessions, and discuss values on sustainability; all will contribute positively. A quote from one of the interviewees (I.6); *"The knowledge is everywhere in the company, but it is not used"*. Projects should be managed so that all this (tacit) knowledge is used and heard. This brainstorming or form of spreading sustainability ideas will already be effective in the tender phase and will serve as a differentiator to the clients of HMC. In addition, sustainability should become part of the project. It should be adapted in weekly updates or inform people more about the impacts, and share ideas that have come forward not only project-related but also interesting global sustainable developments (I.2; I.3; I.8). But, one is not awaiting mandatory training or online courses to accomplish in order to ensure that they will add more sustainable actions into their work It has to be fun and interactive (I.2; I.4; I.9).

[5] Behaving sustainably

During the explorative interviews, some sustainable behaviour of employees is detected. The researcher has analysed sustainable behaviour by examining how the employee answered specific questions with examples of sustainable initiatives. Moreover, sharing ideas concerning sustainability has shown the sense of care some employees have or have not regarding adding sustainable aspects to the project scope or their daily work considerations. This is also expressed in the answers involving a certain mindset towards the developments regarding the topic and, according to I.5 *"that one should have the guts to think about it."*
Some general answers define that people do not care that much yet, they admit; I.1 – *"It is not on the top of my bookshelf."* or I.6 – *"It is not something I take into account in the decisions I make."* This shows that one is not yet well aware of or engaged in the mission of HMC and how they can create sustainable values.

Positive attitudes towards sustainable behaviour at HMC are found through examples of sustainable behaviour considering the role of the client. Found here is that to get more sustainability into the projects, the position towards the client is exposed. One should collaboratively come to sustainable solutions, where the role of HMC is to explain and take the client by the hand by introducing a new way of sustainable working (I.4; I.8).

Another factor mentioned when talking about how the organization should assess sustainability is the company's status. It is of influences whether the company can propose certain sustainability topics to its clients because when the position of the company is hanging a thread and relies on every tender, these discussions with the client are less easy (I.8). When this is not the case, one can go into discussions on whether investments can be made collaboratively with the client to achieve increase the environmental performance of the project. Thus, the company's current status, whether in need of operations or a spillover of projects, can affect the negotiating position on sustainable investments.

4.6 Conclusions of the explorative interviews

This section will summarise the important findings from the interviews that will be used to design the intervention.

All interviews show that people took the time and patience to contribute to this research. All were curious about what the research was about and was willing to share their ideas and experiences. In addition, the researcher observed a positive ambience moving out of the interviews as every interviewee saw the urgency that the organization needs to put effort into engaging all its employees in their work towards its missions statement; *''To be the leading marine contractor creating sustainable value(s) for clients and stakeholders'' – HMC.*

To start with, it is important to highlight what environmental impact the industry has to focus on. From interviews, most of the same environmental impacts were mentioned. One was not aware of where one can make a positive contribution to the company's environmental performance of the company through many more environmental actions.

During the interviews, many limitations and motivations for thinking of sustainable solutions came across. To design an intervention that can be related to the real world, it is important to address the following:

- **Limitations:**
  - Necessary resources needed to think of sustainability like money, time and knowledge.
  - Client and external influences that follow into design restrictions of the project.
- **Motivations:**
  - Working on sustainable projects and highlighting technological breakthroughs, like shore power and sailing on LNG.
  - Working together towards sustainable solutions and designing high-end engineering solutions that shape the future.

Lastly, the one responsible for ensuring and facilitating sustainable behaviour within projects has to be the project managers. It is their task to determine what aspects will be included in the project and what engineers need to focus on during design. Besides, nearly all interviewees think it is the manager's task to initiate brainstorming sessions or working sessions on the sustainability topic. Interviewees were enthusiastic about having brainstorming sessions on environmental actions or impact indicators and having the time to think about new technologies to reduce their impact by executing the He-Dreiht project. This shows that the knowledge and willingness are there, but it is not used in a way to make a positive impact.

Key takeaways from chapter 4

- Environmental performance indicators, recognised throughout the industry, are crucial to implementing every sustainability initiative.
- HMC is making great strides in its approach to sustainability and is doing so through high-overhead decisions by investing in new technologies and having a sustainability department.
- However, the employees within the organization do not feel empowered to contribute to sustainability ambitions.
- For employees, it is essential to know what environmental impact indicators occur when designing an offshore project. From there, one can start to think of actions that will reduce or limit the impact caused by the project.
- From the employees' viewpoint, time, money, and knowledge are limitations to acting more sustainably within their roles and responsibilities.
- People want to contribute but do not know how; the topic is not part of the agenda, and clients ask for it but do not yet consider it in their decision-making.
- Find an environmental performance indicator that measures efforts being made to deliver more sustainable projects.
- A future perspective on tackling sustainability: creating reporting mechanisms to track emissions or other impacts caused by the projects in order to set project-specific ambitions.

THE DESIGN

This chapter refers to the design and development, demonstration and evaluation phase of the Design Science Research Methodology. It has three parts; the conceptual design, the evaluation and the final design of the intervention. After retrieving the data from literature and qualitative studies, the researcher focused on designing the intervention toward a solution to the projected problem of this study. The first section of this chapter will explain how the design is constructed and demonstrated through creative thinking and iterative processes. The conceptual design tries to cover all factors influencing sustainable behaviour in the context of the case study and interviews.
Nevertheless, design decisions had to be made to come to a feasible intervention. The demonstration phase is executed by creating prototype interaction and evaluation with the users of the intervention. Regarding the findings of the demonstration phase and a final iteration, the intervention's final design is shown. Therefore, this chapter aims to answer the last sub-research question:

'What intervention would fit a marine contracting organization to make employees aware of its sustainable behaviour and performance?'

5.1 Interpretation of the data

To interpret the data collected for this study, a mind map is made of the important aspects on how to stimulate and sustain sustainable behaviour in a marine contracting organization within the project scope. This mind map (figure 21) collects the objectives of what the intervention should involve.

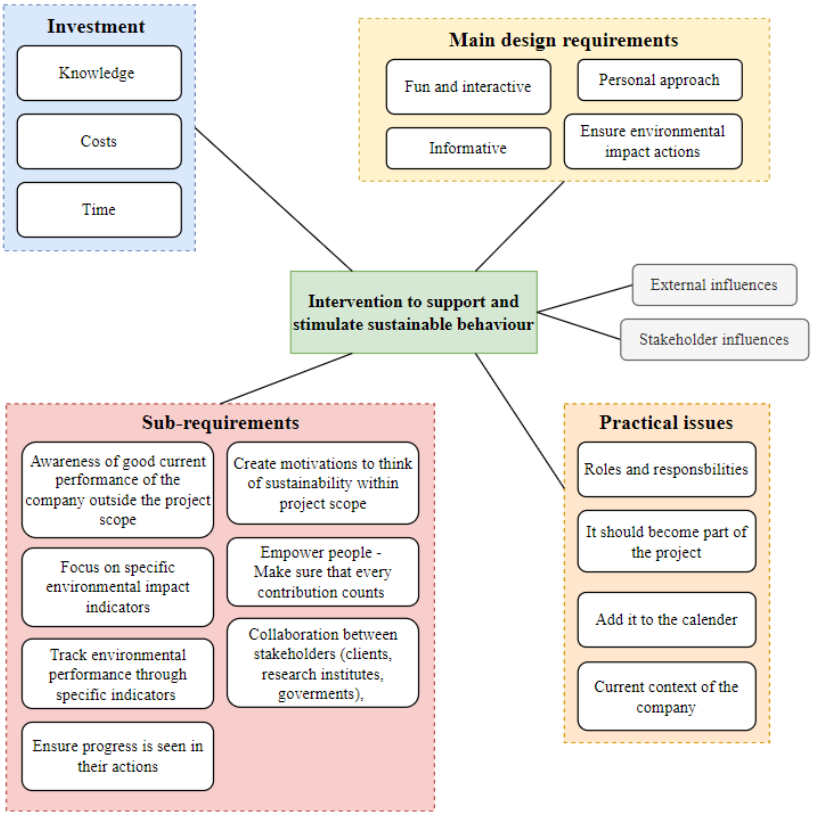

Figure 21. Mind map including the important data points regarding findings from literature and qualitative study (own illustration)

A summary of how to interpret this mind map and the takeaways for the design of the intervention is found below.

- The main requirements of the intervention are found in the top right yellow square. These come from the literature as well as from the qualitative study findings.
    - The design decision to use a personal approach is made based on literature and qualitative data collection. Retrieving one's personal values and beliefs should be how a marine contractor can stimulate and support sustainable behaviour (Marcus & Roy, 2017; Silvius & Schipper, 2020). With a personal approach in the intervention, the aim is to discover the personal values and beliefs of the employee in order to start the conversation after the intervention is used.
    - The fun and interactive requirements are important since employees are not awaiting more training or mandatory follow-up sessions. The use of the intervention must ensure that memories are recalled about the moment when the team thought of sustainability.
    - The intervention must consist of informative aspects. This is also important to place experiences from the intervention into real-life decisions during project design and inform one about the possible impact on the environment and activities that may have a positive impact.
    - The last one, ensuring environmental impact actions, is a requirement to make one aware of positive actions to improve sustainable performance.
- In the top left blue square, the limitations on acting or behaving more sustainably are found. Time, money and knowledge limit employees' ability to think of sustainable solutions in their role or responsibility. It must emerge that one needs to invest in at least one of the three to act sustainably.
- In the bottom left red square, a collection of sub-requirements is found. These are gathered through studying the literature and qualitative data to help stimulate and motivate people to behave sustainably. These seven sub-requirements help to specify the design of the prototype.
- The bottom right orange square collects the practical challenges covering the design of the intervention. Exploring its usability, it is essential to secure that it can be used in a project team, and one has to make time. Furthermore, roles and responsibilities and the project context must align with how the project team handles challenges that arise during projects in the real world.

The last two grey beams are included to ensure that those influences are taken into account in the prototype. From qualitative data, it has been inevitable not to include these factors into the scope of this intervention since they exert significant influence on how the project team thinks and behaves considering sustainability.

5.2 Intervention using gamification

Regarding the DSRM approach used in this research, the research aims to design a prototype that will contribute to the objective. Reflecting on the objective; of providing sustainable behaviour through an intervention, this section will explain how the researcher has come to the prototype.

After data was collected and analysed, the researcher started to explore possibilities in finding the right design for the intervention. Through explorative conversations with employees of HMC, e.g. Process Improvement Manager and General Manager Sustainability, and iterations

with colleagues and friends, the design decision was made to use gamification theories to design the sustainability intervention. The first step of this process was to retrieve input from literature and experts who have had multiple gamification experiences in the real world. In the next section, a short explanation is given of what gamification means and why it can be put to good use for sustainable challenges.

Gamification

As stated by Kotsopoulos et al., "gamification is the use of game design elements in non-game contexts" (2017, p. 2864). It usually is used to create participation, improve performances, create greater compliance and stimulate a behavioural change in the end-users. At the workplace, one has seen that employees get challenged through games in order to create a fun environment to work in. In the past few years, one has seen that games have been implemented to promote pro-environmental behaviours. These games have aimed to educate people on climate and environmental aspects such as energy and waste management, air quality, transportation, water conservation and energy reduction (Douglas et al., 2021).
Regarding these aspects, one has designed games with context-related goals to achieve, levels and rewards. It is crucial to trigger the end-users via actions and strategies to engage them in the process. At last, gamification is known to improve people's intrinsic motivation by engaging them with project-related challenges in the area where one desires a behavioural change. The main goal of gamification is to get people to participate, engage them with the given context, and ensure interaction. Another aspect to consider is that games are easy to sell as fun and engaging and will motivate more people. Besides, a game must consider the collaborative aspect; working together towards a particular goal motivates people (Kaufmann [TEDxYouth], 2014).

Knowing what gamification can bring about, it is essential to gain information about how these games are being developed from an expert point of view. During an informal interview with Gracia Bovenberg-Murris, project leader at the GameLab TU Delft, input was retrieved on how to design and create a game on changing behaviour. The unstructured conversation confirmed the expert's view that using games to create a fun activity for people contributes to initiating a behavioural change. Nevertheless, the expert also denoted some critical points on using games to ensure behavioural changes.
Some points that were discussed:

- Think of your audience;
- Think of crucial elements: specify why you choose certain elements;
- Think of interactions;
- Ensure the link with reality through debriefing;
- Think of how the game will end;
- Think of role-playing: one wants to explore and try new things.

In the figure below (figure 22) the design principles from exploring the use of gamification with findings from the literature and qualitative study are illustrated. These design principles are specific analysed upon creating awareness, stimulate and support behaviour within project teams in a marine contracting organization.

Figure 22. Game design principles to design the intervention game (own illustration).

5.3 Prototype

The key takeaway of the experts was to use already existing game theories and games to design the intervention game. Therefore the researcher combined input from already existing games, creativity, requirements from the findings and technological insights to create a prototype of the intervention, the sustainable behaviour game.

Goal of the game

The goal of the game is two-sided. On the one hand, the game is designed to serve as an activity for project teams to become aware of the environmental impact of projects executed by a marine contractor. On the other hand, create interaction, and propose possible environmental actions that reduce and prevent the impact. With this game, it is assumed to nestle a sense of care towards the environment, and it will stimulate sustainable behaviour in future engineering work. The game players will experience this emergence to caring for the environment by retrieving the responsible task to cope with caused environmental impact from a fictitious project. Their task is to acquire environmental actions that are in line with the strategy of the player's assignment to reduce and prevent environmental impact.
At the beginning of the game, one retrieves the resources necessary to invest in environmental actions; money, time and knowledge. This is to make the players aware of the necessary efforts to ensure an environmental action is realised. Furthermore, during the game, external factors influence how the player should invest resources into environmental actions to reduce or prevent environmental impact. This is important to link the game to reality; due to unannounced external factors, players of the game will endure setbacks or motivations to invest resources into specific actions. This is in line with the current risk-averse decision-making for marine contractors. The game's goal is to collect the right amount of environmental actions to fulfil the fictitious project with an as low as possible impact on the environment.

How the game is played

At first, the context of the fictitious project is explained called No Limits. The No Limits project considers installing and transporting monopiles in the North Sea to generate 90GWh of wind energy per year. For the installation, the projected environmental impact is prospected to be over 23.000 metric tonnes CO_2 eq. Other contextual factors are the ETS legislations that will be active during operation. The ETS price is estimated at $159,60 /metric tonnes CO_2 eq. These numbers are given to establish the link with reality and give the players a feeling of emergence to act upon the environmental performance.

Hereafter, the rules of the game are explained. The game is played with four, and everyone acts from the project manager position. The game moderator, known as the Chief Sustainability Officer (CSO), can exchange resources for environmental actions. The impact on the project's environment is reduced by retrieving green points belonging to particular environmental actions. The game is played in 5 rounds; each round, every player can choose to invest in actions. Every round starts and ends with an external factor to cope with introduced by the CSO. Each factor has a labelled consequence that will influence the investment round. In each round, the CSO will also announce how many actions one can invest. Each investment requires several resources that must be exchanged to implement the action into the players' No Limit project design. The player that ends up with the collection of environmental actions and thus has designed the project with the lowest impact wins. Further structural explanations can be found in appendix H. In the next section, every aspect is explained regarding the decisions made according to the design principles and retrieved data on environmental impacts.

Goldies

Goldies are designed to be the currency of the sustainable behaviour game. This collects all the resources one has to invest to realize an environmental action. The decision to choose a collective currency of the three necessary resources has been made on purpose. By assigning money, time and knowledge as essential resources, the players will become aware that investing in action requires multiple efforts. The amount of goldies needed to invest in a specific action is noted on the action card.

Green points

The number of green points stands for the impact reduction or prevention level the environmental action brings along. In other words, green points are chosen to be the performance indicators of environmental actions. In the real world, it is hard to create a standard indicator for all environmental actions since it is not yet possible to directly measure every action in terms of CO_2 eq. that is reduced or prevented. So, a standard indicator is chosen to give the players an easier understanding that more minor actions also count in lowering the environmental impact. Per action, it is different what amount of green points are assigned, and green points are also noted on the action cards. The number of green points per different action has been considered by the researcher based on the knowledge of whether what action creates a more positive impact than others in real life.

Impact cards

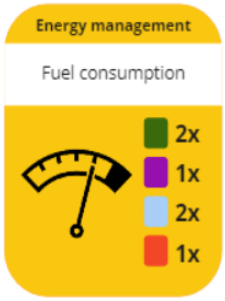

Figure 23. Example of an impact card (own illustration)

Impact cards serve as the players' assignment of the game. The assignment entails reducing the stated impact on the card by investing in the specified amount of action cards described on the card. Every player retrieves two impact cards to cope with during the game. Once a player has fulfilled the impact card, the number of green points on that card will double. The impact card determines the strategy of each player. Each impact card is categorized within a different environmental impact stated by the IMCA; GHG emissions, Energy Management, Life below Water and Waste Management (see appendix H).

Action cards

These cards highlight the broad area of taking action to safeguard the environment. With these cards, the researcher points out the different possibilities that contribute to a project design that takes care of its environment. Every card is categorized the same as the impact card (GHG emissions, Energy Management, Life below Water and Circular Economy) and are divided through colours. On these action cards, one finds the number of goldies to invest and green points to be awarded when the investment is made.

Figure 24. Example of an action card (own illustration).

External cards

The external cards appear at the start and end of each round, and the CSO randomly picks them, and the consequence will be read out loud. The consequences of each external card form the risks one has to cope with in real project designs and ensures that one will choose a particular investment strategy for coping with the impact and taking care of the environment.

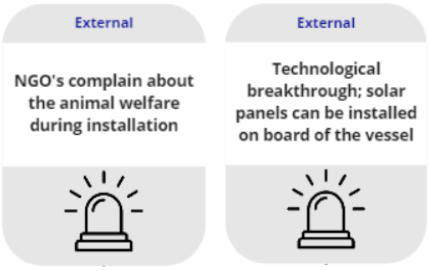

Figure 25. Examples of external cards (own illustration).

5.4 The design principles

User focused

The game focuses on the user since the players are challenged to determine their strategy to reduce and prevent their environmental impact. Moreover, the game is designed to engage the users in the company's sustainability challenges. Making it fun and interactive through external factors and discussions with team players ensures that the users' focus and energy are assured.

Implement only key elements

The game is held quite simple for this first game on creating sustainable behaviour. Only the key aspects that are found in the current challenge of stimulating and supporting sustainable behaviour have been added to the game to avoid complexities. This is also important since the game will mostly be played as an introduction to sustainability and does not need to have precise information on whether the environmental impacts and actions are also appearing in the real world.

Link with reality

The link with reality is made by focusing on a project that is in line with how a project in the future will look like. All environmental impacts have been aligned with the current impact measured by the IMCA (IMCA, 2022). Besides, the actions to reduce the impact come from the input of HMC's current projects and other technological developments in the marine contracting industry to reduce one's impact.

Reward system

The game's players win the game when they ensure the lowest environmental impact. Intermediate rewards are given when one achieves all necessary actions of their impact cards that will double their green points. In that way, they are stimulated to invest in the right actions and think of how to execute their strategy wisely. When handling the right balance of investing and saving money, they can retrieve more green points by investing in offset projects contributing to their final score.

Strategy

The players' strategy is determined by their impact assignment and the influences of external factors. The latter creates the feeling for players to invest wisely, taking the risks into account of external factors that may interfere with their decisions to invest in specific actions. Therefore the players are challenged by overthinking their investment strategy to make the most out of their environmental actions.

Ensure interactions

Since the game is played with four players and one player as a CSO around a table, there are many opportunities to create interactions among players. Some external factors ask players to invest in specific actions collaboratively and the opportunity in the final rounds to trade among actions to fulfil the highest impact to all. Everyone sees the investment decisions being made, as each player takes turns revealing his/her investment and thus, one may react to each other with questions or fanaticism.

5.5 Demonstration of the prototype

To go into the demonstration phase of the DSRM (vom Brocke et al., 2020). Interaction between the users and the prototype of the game has been established. During this interaction with the prototype, the researcher focused on the user experience and retrieved vital feedback to improve the design. This section will elaborate on how the prototype interaction was prepared and what essential aspects were detected.

Preparation

According to the interaction prototyping and evaluation methodology explained by Zijlstra et al. (2020), the researcher has organized one test session of the prototype. The interaction prototype was ready to execute this test session as described above. The players were instructed to play the game as if the game was already finished (Zijlstra et al., 2020). The test users of the game were three full-time employees and three graduate students of HMC.

Before, a scenario sketch was made on how the researcher prospected the users to behave during interaction with the prototype. This is important for the researcher to create expectations of the design decisions. The scenario sketch is seen in the figure below (figure 26). For the interaction, a time plan of an hour was scheduled in a training room within the office of HMC. However, this room appeared to be occupied, so by accident, the test session ended up being in the presentation area. Pictures of the setting of the session can be viewed in appendix I.

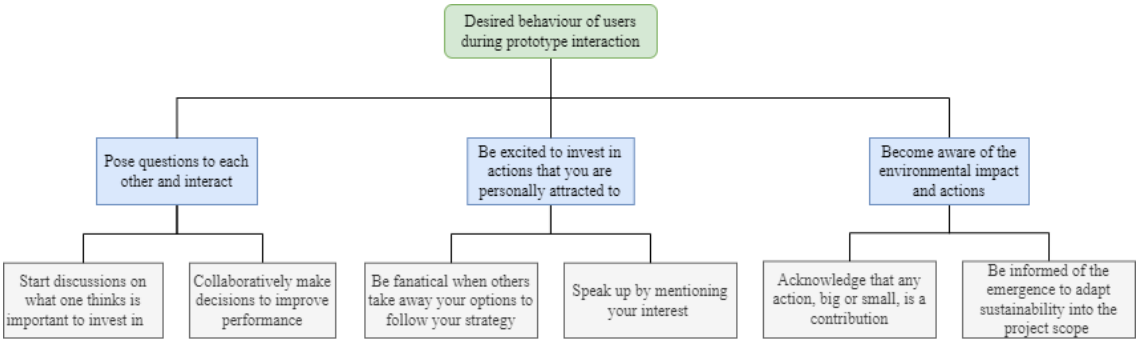

Figure 26. Scenario sketch on the expectations of the researcher of the behaviour of users during interaction with the prototype (own illustration).

Evaluation of the protype interaction

After the user interaction with the prototype, the researcher established a 15 min evaluation session with the players. The researcher recorded the session, took notes on the analysed behaviour and facilitated this evaluation. The following questions started the evaluation:

1) How did you feel during the game?
2) Did you experience interaction with fellow players?
3) Do you think it can make employees aware of more sustainable project designs during their work?
4) Can you relate this game to real-life decisions from projects?
5) Do you have points for improvement?

Regarding the questions above, an unstructured evaluation session followed. All players had the opportunity to share their ideas and findings of the just-played game. An interesting discussion started where design improvements were created. These are listed briefly below.

Evaluating the interaction of the prototype, structural adaptations on how the game can be improved are;

- Plan more time for the game;
- Play while standing;
- Create teams of two; this stimulates interaction;
- Each investment must be read out loud to create an extra moment for awareness.

Other findings from the evaluation of the prototype were content related in order to secure the projected goals of the game better;

- **More external cards**
    - The external cards were seen as noise that interfered with players' strategies. This is a critical aspect of linking the game to an actual project where constant external factors play a role in the decision-making. Ensuring more external influences will set the players towards valuable thinking of what each environmental action withholds in line with possible future developments before the investment.
- **Create a scoreboard**
    - This is to give the players a sense of progress toward the primary target; designing the No Limits project with an as low as possible impact on the environment. Further, they get motivated to perform better and think out their strategy compared to how other teams tackle their environmental impact.
- **Have fewer goldies**
    - The players must be aware of the limiting factors of executing environmental actions. The game will enhance strategic thinking by having a strict limit of goldies. Giving the players fewer resources from the start, they have to be conscious and responsible in what actions they will invest in. In addition, this also may create an extra incentive to overthink an action on what it may deliver for the environmental design of the project.
- **Focus more on the meaning of the environmental action cards**
    - Players were focused on the number of green points and the colour of the action cards instead of the meaning of the actions described. To improve, make the action cards two-sided, on the one side, the stated environmental indicator (GHG emissions, Energy Management, Life below water and circularity), and on the other side, the environmental action, the costs of investment and the number of green points. With that, one is challenged to consider whether an environmental action appoints to the needed environmental impact indicator they aim for in their assignment and strategy.
- **Promote collaboration**
    - During the demonstration, the researcher aimed to observe more collaboration. However, this could have been more. Players must be triggered to trade certain environmental cards among each other, so incentives must be created.

Answering the evaluation questions, the observed behaviour is overall positive. The players were enthusiastic about playing the game. When things were not clear, there was a possibility to pose questions to the CSO. Besides, sometimes competitive behaviour was analysed when a player was focussing on a particular investment to make when others were also willing to invest in that action. Interaction among fellow players was then felt through the competitive aspect of aiming for the best-designed project. Also, players saw the difference in the number of goldies and the number of green points. Some not-so-obvious actions were worth a significant number of green points. To conclude, reactions were positive when asking whether the players would implement this game to stimulate and support sustainable behaviour. It is a fun and engaging game to play, especially when a project team has not been that long. Together it serves as a good way of team building as well. Some contextual and structural alternations

were necessary, but possible to decide whether the intervention game could be related to real projects.

5.6 Finalizing the design

To conclude, three phases; design & development, demonstration and evaluation, and final iterations have ensured a finite prototype of the intervention. This finite prototype has been discussed with the GameLab TU Delft Project Leader – Gracia Bovenberg-Murris; no further demonstration has been done because of the limited research period. For a final game design, findings during the demonstration are used, and iterations from researchers' thinking of solutions and discussions on improvements with players afterwards.

Final design implementations

The structure-related evaluation insights will be implemented in the second version of the prototype. These are all easy to implement and were not considered of influence before the demonstration phase. Adding these to the second version increases the performance of the game.
The researcher reconsiders the content-related points from the evaluation. Aiming to ensure all game design principles are included in the most efficient manner, the design has been improved. The improvements are mainly focused on the design principles: strategy, reward system and link with reality (figure 22).

Adding a scoreboard is the first counted aspect to the sustainable behaviour game's prototype. This scoreboard (figure 29) will serve to create a better link to the assignment of the game; "One is in charge of designing and installing a wind farm in the North Sea", so therefore this scoreboard is chosen as a sketch of the area where the wind turbines will eventually be installed. Teams can check their progress using the colour/player-assigned crane vessel installing wind turbines on the assigned dots. Every dot will account for a certain amount of green points, so when a player invests in environmental action, it can be seen on the board by installing a turbine on top of an empty dot.

A scoreboard will help the players to structure their investments regarding progress towards the ultimate environmental design. Players are also able to see the performance of the other teams. This will also have a positive contribution since the research of Young et al. (2015) and Barlett et al. (2011) also described the positive effects of tracking performance among groups and making them aware that their performance positively influences the behaviour of employees.

The second important aspect that is added to the game is the change in the design of the environmental action cards. In the prototype, the players knew the environmental impact category, and it was an easy decision to invest in an action card since the colour highlighted it and it was the card's title. In the improved version, the environmental impact category will be unknown to the players until a successful investment. With that, players are triggered to think about whether the environmental action will reduce or prevent the environmental impact (e.g. GHG emissions, Energy Management, Life below water or Circularity). For example; one has the fulfil the impact card on the right; this means that the player at least has to invest in one environmental

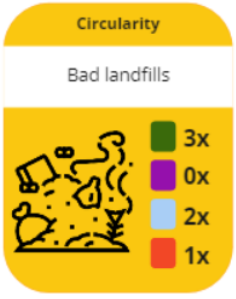

Figure 27. New impact card (own illustration).

impact card that focusses on Energy Management. The new design of the action cards can be seen in figure 28.

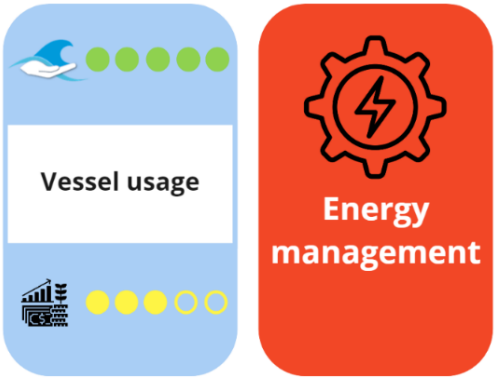

Figure 28. New design of the environmental action cards (own illustration).

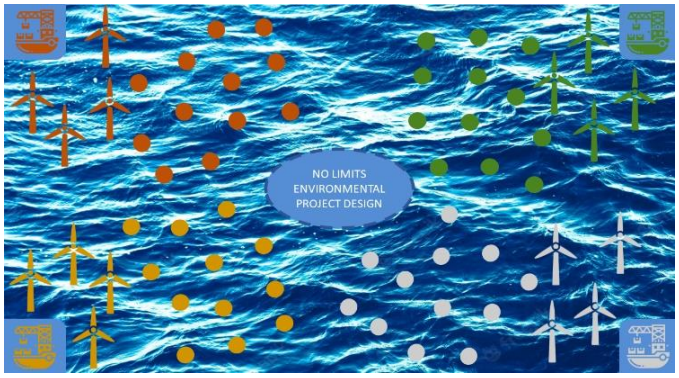

Figure 29. New designed scoreboard to track performance during the game (own illustration).

Implementing these two changes into the first version of the protype is prospected to solve the challenges that came across from demonstration and evaluation. Regarding the discussions with the expert on designing games, Gracia Bovenberg-Murris, *''Implementing a double sided action card is a great idea, this leads to more considerations of the teams whether they are making the right choice to invest in that certain environmental action.''*.
From these discussions, the researcher came to the final iteration of giving each team a choice when it is their turn. Give them the option to invest or wait until the next round and retrieve extra goldies. This is in line with the natural world; coping with insecurities takes time, and one needs to consider the best option to invest in, which also allows one to await external influences. Thus passing by the turn and retrieving goldies secures teams to think through their investment.

To conclude, this second prototype is not demonstrated yet, however it is evaluated with the help of the expert. Hence, the design is not final, improvements of games will appear when games are played more often (Gracia Bovenberg-Murris, Project leader and Game designer TU Delft, Sept, 7 2022).

Key takeaways from chapter 5

- Gamification is considered to create awareness among employees within a marine contracting organization.
- It fits within project teams since the game allows team building at the start of a project. Additionally, the game mentions the team aspects of creating sustainable values and addresses what design elements should be considered in the project.
- Playing the intervention game is seen as a tool to apply a specific sustainable strategy and a way to express personal values on certain environmental impact indicators.
- Using gamification in the intervention allows several facets to be addressed. It combines real-world design decisions with gameplay elements.
- The collection of elements within the game, environmental impact, actions and external events in the marine contracting industry ensures the link to the real world.
- The game consists of environmental actions that can be recalled when the design starts. This assures that after every game played, one can recall the specific actions and investigate whether they could be adopted in the real project design.

DISCUSSION

This research aims to design an intervention that will stimulate and support sustainable behaviour to create awareness among employees about their contribution to tackling sustainability from a marine contractor perspective. This chapter will discuss the limitations of the research and the methodologies used in line with achieving the objective. This is done by discussing the Design Science Research methodology, data collection and research validation. Lastly, the chapter closes with an outlook on how the designed intervention should be implemented in a marine contracting organization.

6.1 Limitations of the research

This section highlights the limitations of this research based on the methodologies used, how data is collected, the context in which the research is performed and the feasibility of the intervention.

Methodology

The Design Science Research (DSR) methodology is followed in this research. However, another research methodology would have also been possible to execute the research. Action Research (AR) is one of the best-known counterparts of this methodology. AR follows a simultaneous process of taking action and doing research. It starts with a problem and immediately develops possible solutions collaboratively with relevant stakeholders (Ivari et al., 2009). Using AR could have resulted in a more client-focused exploration of the relevant aspects of creating more awareness of sustainability within a marine contractor. The client, in this case, is the marine contracting organization for which the intervention is designed. However, the paradigmatic methodology of AR is more ideographically focused instead of also building an innovative intervention. The latter is considered in the DSR methodology it forces the researcher to retrieve a main knowledge base and information about the need from its environment to design an intervention that can be applied in the real world. It still accounts for the clients' preferences but combines knowledge of earlier studies in the innovatively designed intervention. As stated by Ivari et al. (2009), DSR is a methodology that creates new and innovative designs rather than AR, which is more context-dependent.
Regarding the above, discussing both methods, the preference has been given to DSR since it allows the researcher to explore design aspects outside the context given in a marine contractor organization. This has resulted in the adoption of gamification, which is utterly new to the company.

Context-based research

Another limitation of this research is the context-based research, this only accounts for the demonstration and evaluation steps of the DSRM. Since HMC is a Dutch marine contractor with Dutch culture and mentality, it is questionable whether the demonstration and evaluation steps in the research would retrieve the same findings as when the design was demonstrated or evaluated by another marine contractor from another country.

Focusing on how just one marine contractor coping with the sustainability challenge in one country limits the international implementation of this research. In other regions, marine contractors face different sustainability challenges. It could be that a company that operates in Asia is differently restricted by resources, external regulations or client requirements to implement more sustainable solutions in their projects. Besides, the behaviour of employees at the workplace is influenced more easily in that area via different forms of communication. Nevertheless, this has been out of the scope of this research.

Shortcomings of research scope

In addition, found in the literature, a couple of influence levels can be used to influence sustainable behaviour. However, this research has only analysed the influence level on tackling sustainable behaviour on individual level. The other influence factors, group, organizational and external, could have been analysed, but the researcher chose this differently. Nevertheless, the decision to explore how an organization can influence people's behaviour on an individual level has ensured an extensive analysis and design that has promising applicability to be used in combination with different influence levels. But, this would require a separate study to show.

Data collection

For this research, data is collected via a literature study and a qualitative study executed within a marine contracting organization. A narrative literature study is suitable for this type of research since the literature is used to gather insights from journal articles and textbooks about sustainable behaviour in a marine contracting organization. This topic asks for a comprehensive approach to address a broad range of challenges. That way, the researcher learns about the problem in a broad context and summarizes the outcomes of earlier studies among analysis of sustainable behaviour and successful implementation of management systems regarding sustainability performances. The downside of a narrative literature review is that it is a less structured approach than a systematic review. This makes the research less reproducible and ought to include a higher researcher bias because of choosing what literature should be included or not.

The qualitative data of this research is collected via the analysis of a case study company and the execution of semi-structured open-ended interviews. The collected data complement the established knowledge base from the literature and help the researcher design the intervention. Using qualitative data, the research retrieves empirical evidence on the topic and offers the researcher real-world knowledge on the applicability of the proposed design. A possible downside of a qualitative study is that the validity cannot be checked because of only a limited number of interviewees (N=9). The results could have been different when more or fewer interviews were conducted.
Nevertheless, as described in the summary of findings from all interviews, no new themes or patterns emerged as the interviews were conducted. Further, an uneven distribution of personas within the interviewees concerning roles and responsibilities and the shortcoming that they all work for the same organization may have influent the results of this research. Sample selection was made via an external advisor within the case study company, of which the researcher assumed to have chosen a fitted group of interviewees. Lastly, developing codes and themes in the thematic analysis that determine how the data is interpreted in the results can lead to different outcomes since the determination can differ among researchers. Regarding the limitations above, an additional qualitative step has been performed to verify results from interviews and the design with experts (Process Improvement Manager of HMC & Gerdien de Vries, climate psychologist TU Delft). This showed the significance of the collected qualitative data.

Interaction prototype evaluation

The evaluation has been performed using the methodology explained in the book of Zijlstra et al. (2020). However, following this methodology, no accurate measurements or numerical data are tracked on whether sustainable behaviour was stimulated or supported after the demonstration. The methodology followed only proposed a debriefing moment with users through questioning whether the objective of the intervention may be achieved or not. This

limits the research in concluding whether the intervention has resulted in improved sustainability awareness.

Feasibility of the intervention

As stated in the literature, many sustainability strategies and behavioural changes are based on reliable and concrete data (Denčić-Mihajlov, 2018), which can only be retrieved when a reporting system is aligned. However, there was no option in this research to use data from a reporting system on environmental impacts or behaviour changes since these are not yet developed.

Furthermore, questioning whether the designed intervention will achieve long-term changes in stimulating and supporting the behaviour of employees within a marine contracting organization within the project scope is not defined in this research. Limiting time in the research period has made it unclear what would happen when an employee uses the intervention multiple times. This will be elaborated further in the outlook of this research.

6.2 Implementation of the intervention

To conclude this chapter, this section describes what a successful implementation plan of the intervention would look like. Considerations come from findings from the literature and the qualitative study. However, this plan has not been validated; it describes the logical next steps for a marine contractor organization to explore this field of tackling sustainability. The implementation plan is written so that it highlights specific actions to structure a fitted pathway on how to implement the intervention in a marine contracting company.

Action 1. Assign a game owner

The first step in implementing the intervention in the organization is to assign ownership. As Blackburn (2007) mentioned, taking ownership and specifying a role and responsibility in the intervention helps place the intervention into the organizational structure. Besides, taking ownership of the game is a way to assign importance to all the efforts given. The intervention serves as a tool and possibility to start acting more sustainably; thus, it is vital to install the right efficient enablers to explore the possibilities of the intervention. This game owner also serves as a leader or champion that can inspire others to set them towards moving forward on sustainability (Blackburn, 2007). In addition, set them to action (using the intervention game) by making them aware of the accountability within their work of the total environmental impact the company exerts on its environment. From there, promote the game as a fun and interactive start for people to be creative and think of possibilities to improve their performance.

Furthermore, discussing whether the game can use insights from the already established programs on company culture or organizationally comprehensive training is helpful. At HMC, some programs teach employees how to act as a Founder (according to the methodology of Zook & Allen) or a Dare to Care safety training that makes one aware of acting safely and speaking up. The game owner should retrieve insights from this training to avoid ambiguity.

Action 2. Communication to employees

Selling the game

The game should be considered a starting point for project teams to interact on an informal basis while playing the game. During the evaluation phase, it was said that the game served as

a team activity where one could see how colleagues behave in this context. The game was experienced to be fun and interactive. The game suits to be played at the beginning of the project phase to get to know each other better. Therefore, selling the project to project managers as an activity to assess sustainability in a team-building format can trigger them to give it a try.

Playing the game

Furthermore, starting the game with an explanation of the rules and how one plays the game is recommended. Another aspect that ensures the game's goal is setting expectations and discussing personal sustainability values. For this, a briefing and debriefing plan must be written down to track values and whether the game has met the employees' expectations. Doing this will help to better understand and communicate with each other. The game could be a start to initiate sustainable sessions during project design or discuss different technologies instead of choosing a state-of-the-art solution. At last, the players should be asked about their key takeaways from the game, what they learned, and how the topics seen in the game relate to sustainability challenges within their work. This ensures that one will close off the game with a feeling of action.

Action 3. Create a business plan

Marine contractors are tackling their sustainability challenges from a high level. In other words, they tackle their impact by investing in offset projects and innovative technologies that reduce or prevent impact, all activities apart from their current operations. However, this game focuses on making an impact on a lower level by getting a hold of employees' beliefs and values concerning sustainability. Knowing how one values sustainability and analysing their behaviour during the game, one can discover shared values and think of sustainability topics to address in the future as a project team. This game objective is essential to communicate to people higher in the organization to secure support from their side on implementing the game on a broader scale. People higher-up in the organization must become a promoter of the game to make it an organizational-wide activity to start thinking of sustainability more often using the game as a supporting tool (George et al., 2016). Making the game part of the business, through the support of the higher management levels, is critical to successful implementation.

Action 4. Set up sustainable behaviour tracking mechanisms

To support the effects of the game through data, a before and after testing of sustainable behaviour should be included. Measuring the status of employees on thinking of sustainability in their work and their values beforehand can also be used in creating specific aspects in the game to add focus. Measuring the difference in behaviour before and after the game is played is interesting. When people's behaviour and beliefs are measured through questions, managers can specifically target project teams, offering them the right tools and information (Silvius & Schipper, 2020). More importantly, tracking people's behaviour concerning sustainability and having the game as a tool to stimulate and support behaviour will positively affect the reliability of the design.

Furthermore, in the future, the game may ensure performance indicators to support operational decision-making in projects which counts as one of the key drivers of sustainability (Denčić-Mihajlov et al., 2018; Blackburn, 2007; George et al., 2016).

CONCLUSION AND OUTLOOK

This chapter will conclude the research by summarizing the findings concerning the research objectives and questions addressed in this study. The chapter closes with an outlook on future research, the scientific contribution of the research and the significance for HMC.

This research was set out to understand how a marine contractor should assess sustainable behaviour within its organization. The aim was to define sustainable behaviour specifically and look into possibilities of how this behaviour can be stimulated within the organization to ensure support in tackling the total environmental impact of the organization. This question arose from the problem that marine contracting addresses the importance of sustainability in its mission statement and sets a target to reduce the impact but does not experience the awareness to change.
Therefore this study focuses on developing more knowledge on how to stimulate employees to behave more sustainably and explore what intervention can be designed to support this behaviour to ensure all employees can take care of the environment in their decision making.

7.1 Answering the sub-research questions

Considering the key takeaways formulated at the end of chapter 3 to 5, the following section shortly answers each sub-research question.

Answering the first sub-research question:

- ‘What is sustainable behaviour at the workplace, and what factors influence it?’

Answering this question required a detailed analysis of the literature on how one defines sustainable behaviour, from what perspective the behaviour is viewed, and what factors successfully influence behaviour. Sustainable behaviour in this research is defined as the set of actions that aim to safeguard the socio-physical environment (Filho et al., 2021). Translating this into the workplace, sustainable behaviour is analysed when one can make decisions considering the environmental, economic and social impacts of its actions.
The most effective way of influencing employee behaviour at the workplace is to tackle one’s values and personality traits. From the research by Marcus and Roy (2017) and Silvius and Schipper (2020), it is essential to distinguish the three behaviour patterns of employees towards change. The pragmatic pattern, the intrinsically motivated pattern and the task-driven pattern. These patterns can be connected to certain beliefs distinguished in three scenarios on how each behaviour copes with change. Each belief expresses how contextual factors are used to influence the beliefs. The distinction between these beliefs and behavioural patterns helps to discuss what factors will stimulate and support sustainable behaviour, see figure 30 below.

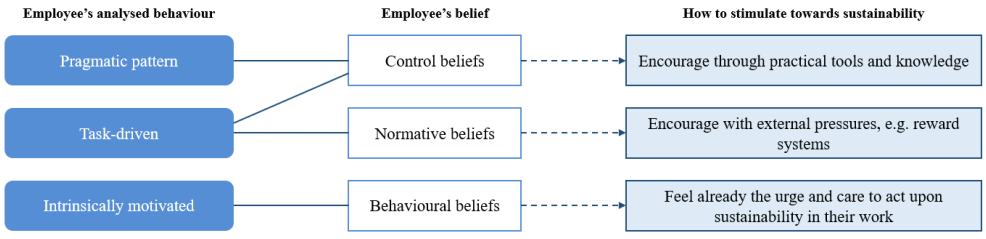

Figure 30. Patterns connected to beliefs and actions to promote sustainability actions (own illustration).

In addition, qualitative findings within HMC showed that a fitting approach to engaging people in sustainability should start with personal motivation. Influencing one’s behaviour has been

done in the past via differentiating programs around safety and leadership. This has all been done via training and workshops where one misses the personal traction. The findings in the literature and the information received from the qualitative study at HMC are unanimous in focusing on a personalised approach to raise awareness of sustainability in a marine contracting organization. Focussing on the personal aspect will trigger new ways of working and tools to trigger one to make decisions while taking care of the environment.

Answering the second sub-research question:

- 'What sustainability management system is suited for a marine contractor to stimulate sustainable behaviour?'

This research question is answered by analysing case studies and literature on managing sustainability in organizations. It is acknowledged that managing sustainability in big organizations is a challenge. However, the first conclusion drawn here is the importance found in the literature of integrating management systems to manage sustainability properly throughout an organization. This is to prevent bureaucracy and support collaborative efforts being taken to improve the sustainability performance. Integrated management systems also limit voids in the system, which is desirable to improve the performance of the whole organization. So, the marine contractor must ensure sustainability aspects are aligned in all management systems and define a structure to report sustainable progress on performance indicators throughout the organization.

The second aspect of this sub-question was what elements should be included in the integrated management system. From here, a selection of essential components of a management system is made. Combining insights from Nawaz and Koç (2018), George et al. (2016), and Blackburn (2007) led to the analysis of what critical elements to implement to address sustainability in a company's management system successfully is found in the figure below (figure 31).

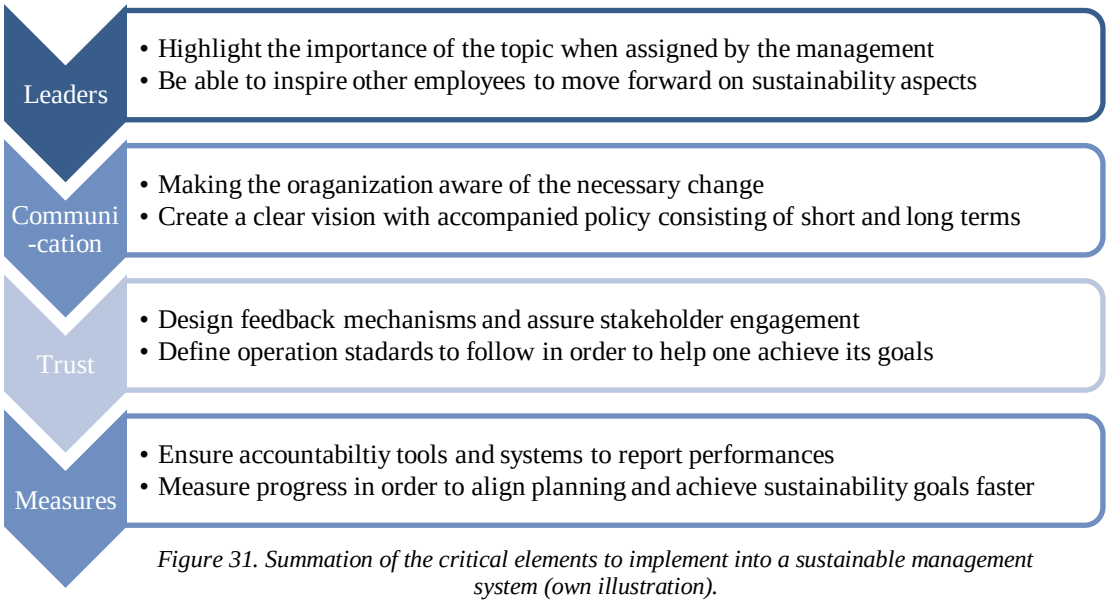

Figure 31. Summation of the critical elements to implement into a sustainable management system (own illustration).

Answering the third sub-research question:

- 'How should environmental performance indicators be considered in stimulating sustainable behaviour?'

This research question required knowledge of the current status of environmental impact indicators and how they can set people towards sustainable actions. While thinking of sustainable behaviour beforehand, employees must become aware of the impact they are desired to care about in their decisions at work. To set employees from a marine contracting organization towards sustainable behaviour, it is essential to give them measures and reporting tools to track performances. Engineering work constantly examines how to reduce risks in the project design. In order to include environmental performance indicators, a broad industry measurement should be included in the risk analysis of marine contractors to stimulate people to think of sustainable solutions.

Answering the fourth sub-research question:

- 'What intervention would fit a marine contracting organization to make employees aware of its sustainable behaviour and performance?'

Through findings from the qualitative study, the researcher gained valuable insights into how employees currently behave, how they assess their performances on environmental impact and how they want to be informed on sustainability. With the objective in mind, making people aware and stimulating them towards taking care of the environment in their decisions, a suitable intervention combines gamification aspects with real-world marine contractor project challenges. Through exploring the field of gamification, the sustainable behaviour game has been designed and demonstrated to stimulate and support sustainable behaviour. This intervention has been shown effective since it adds something different to how people are addressing challenges nowadays and can be implemented easily in the project processes. It can be used as a start of the offshore project's conceptual designing phase. One can fall back on the aspects seen in play during future setbacks on design challenges considering the project's environmental impact. Evaluation sessions were held with employees working at HMC and with experts. Hence one can conclude that gamification in this context can contribute significantly to making employees aware of their current behaviour and stimulate them to sustainable thinking.

7.2 Final conclusion: answering the main research question

According to the previous section, sub-research questions have been used to gather knowledge, triggered analysis within the field of research and have helped to gain a profound answer on the main research question this MSc thesis addresses:

How to stimulate and support sustainable behaviour within project scope in a marine organization?

Stimulating sustainable behaviour within project scope in a marine contracting organization is most effective for examining employees' personality traits and values regarding sustainability. Supporting this behaviour consists of creating incentives to think of sustainable solutions, allowing the employees to think of sustainability within their roles and responsibilities and making them aware via environmental performance indicators. Combining both in this research has resulted in a sustainable intervention game that marine contractors can use to sustain their challenge of reducing and limiting environmental impact.

Before this research, there were no insights into how a marine contracting organization should assess its employees to set them towards sustainable behaviour. By addressing this research question, one now has a practical tool that can be used to stimulate and support employees to think of sustainability in designing offshore projects. This intervention in this market that has to cope with many different stakeholders is a start to tackle project work differently. Placing sustainability on the agenda and encouraging people through the intervention game to challenge themselves, thinking of adding sustainable aspects to the projects apart from client requirements.

The design, experienced as fun and interactive, makes employees aware of environmental impact and actions in the marine contracting industry. Besides, it also creates incentives to invest time, money and knowledge into environmental actions when progress is seen. A game that challenges players to make strategic decisions on investing in environmental actions to design a fictitious offshore wind farm project, facing external factors and other limitations and motivations, comes close to reality. While designing the game, six-game principles that align with the objective, support and stimulate sustainable behaviour were initiated. These principles are a collection of findings from literature and qualitative study on stimulating and supporting sustainable behaviour in a marine contracting organization and adapted into the designed intervention of this study.

7.3 Outlook

Following the discussions chapter, where the research's limitations are elaborated and the conclusions, this section elaborates on how future research contributes to exploring the field of how marine contracting organizations should address sustainable behaviour.

First, long-term research is necessary to measure a fundamental behavioural change. This is not easy since a research group must commit to monitoring sustainable behaviour for a while. However, this can back up the assumptions made in this research based on one evaluation session or could even find new elements to take care of in the design of the intervention game. With such research, it can be complementary to the current research since it may come up with a baseline on the standard of behaviour in a marine contracting organization. From there, the intervention game can be rolled out, and changes in behaviour can be viewed by measuring actions regarding sustainability or environmental impact.

Secondly, future research should also focus on combining other stakeholders' behaviour and how those affect each other. This research has not highlighted the influences of stakeholders and the power to make decisions within the industry. However, they can play a significant role in structuring a project concerning adding sustainable aspects. Combining their role and behaviour into the game could give the intervention a whole new dimension and create an extra link to reality.

The last suggested future research considers a more significant problem that was discovered during this study. Most decisions being made in the design of a project or other situations are based on financial incentives. The industry is cost-driven, where clients value the sustainable actions of marine contractors but do not consider which organizations can fulfil the job by minimizing risks and offering the best price. In this cost-driven industry, it is hard for marine contractors to find flexibility in the project delivery or budget to implement sustainable solutions. Whether one can change this attitude in the market towards a sustainable driven one will significantly contribute to the opportunities for all activities on lowering the

environmental impact caused by offshore projects. This research area can be explored by studying the overall market of marine contractors. What are the specific future challenges on sustainability to cope with, what regulations are coming up and how will the whole market move towards it? Relevant questions that influence the behaviour of marine contractors concerning sustainability but were out of scope in this research.

Scientific contribution

As discussed earlier, this research focuses on how literature and qualitative findings can be used to develop and validate an intervention. Such research focuses on how to develop solutions for practical engineering problems. Since the design science research methodology is followed, it has been the main objective to develop knowledge and understanding to design solutions that will help solve socio-technical problems via building a practical design (vom Brocke et al., 2018).

In this research area, a collection of literature based on stimulating behaviour, supporting systems to manage sustainability within an organization, and what environmental impact a marine contractor has to deal with is the base of the intervention design. How the design is further created, followed by the information gathered via qualitative data collection.

The contribution of this research focuses on developing a new intervention that aims to make employees within a marine contracting organization aware of the sustainable impact via an intervention that uses gamification. This newly developed game explores how environmental actions and impacts appearing in an offshore project can be visualized in a game and simultaneously trigger players to interact and take decisions regarding their sustainability performance. This combination of understanding and applying knowledge to a game has not yet been designed in this specific research area. Furthermore, the results are promising regarding successful game implementation via demonstration and evaluation. Following the executed research steps according to the DSRM may offer other researchers a manner to devise interventions in other industries. In other words, regarding the addressed research questions and the methodology followed, a promising intervention is designed to help organisations make employees aware of the environmental impact within the project scope.

For Heerema Marine Contractors

Executing this research at HMC has been extremely helpful in getting to know the industry and company structures. Besides, the output of this research can directly be used in further efforts to engage employees in sustainability ambitions. This section will shortly elaborate on how HMC will use the findings and what the findings could do with the company.

The most important result of this study is that a sustainable intervention game that has been designed and demonstrated in which employees of HMC admit it can successfully be adapted to their projects. In addition, the Sustainability Department can use this research as input to start exploring, stimulating and supporting sustainable behaviour within the organization even further. By initiating the sustainable behaviour game, more employees will start to track their decisions in taking care of the environment and will explore tools and measures to track their efforts which may result in better sustainability performance for the company.

However, HMC is now in charge of the follow-up on the game and can start doing tests with other project teams. This game consists of the specified environmental impact and actions to the company from where it can be tested further and alternate accordingly.

To conclude, an essential aspect of this research is that this game is the start of changing the behaviour of employees to take care of the environment in their decision-making. It has been seen that giving employees the right tools to tackle sustainability within their responsibilities is more challenging than improving the sustainability performance of the company through the efforts of the sustainability department. However, this research tries to get a hold of that. Making employees aware of how they can, or already are, influencing project designs through investing in resources (money, time and knowledge) can set them towards actual actions or positivity towards sustainability. Therefore, this study and the results contribute by initiating environmental actions, whether small or big, short or long-term, and whether it is only a short brainstorming session at the coffee machine; all efforts may reduce and prevent environmental impact caused by the operations of the company.

Structural actions after this research for HMC

The researcher proposes that HMC should explore interest in playing the sustainable intervention game among current project teams that are in the design phase of delivering an offshore project. Following the suggestions in the implementation plan, one should encourage project managers to plan time to play the game with the project teams. This will create a bigger platform for the intervention game within the organization, resulting in more demand from several project teams.

The second action is to determine how one can build a system to track the contribution of decisions made in project teams for better sustainability performance. This creates a real incentive to behave more sustainably as a project team. This system can be based on the environmental actions addressed in this research. HMC should investigate whether the sustainability department can be of help to project teams to track this performance and help them since time is pressing on project teams.

The final action addressed by the researcher is to assign someone responsible, preferably the general manager of Sustainability, to own this intervention game. It triggers a bottom-up approach within the company to create more awareness of sustainability within the organization, so many people will give their opinion. Assigning ownership to a manager can already create a sense of importance and confidence in assessing the sustainable intervention game.

APPENDIX

Appendix A; Explanation of the SOS system adapted from Blackburn (2007):

Drivers within the organization are in charge of taking care of the motivation towards tackling the sustainability challenge.

- A champion / Leader; inspires other in the company about moving forward on sustainability. Main goal to motivate others towards action.
- Approach for selling management on sustainability; for a champion or leader it is hard to tackle the sustainability challenge on its own. Therefore one needs to determine its selling point of how to convince others into a more sustainable way of working. Supporters are there to help and are important to create a feeling for sustainability in the lower levels of the organization.
- Accountability mechanisms; these are vital for the programme. It is a way the company assigns the importance of all efforts given. Even with bonusses or other rewards as consequence.

Efficient Enablers ensure that the people within an organization have the tools and ability to act sustainable. Installing the right efficient enablers will help people work in a successful way.

- Organizational structure; a proper structure or department must be set in order to support the efforts made into sustainable actions and solutions. This team of supporters is essential to lead the company towards a structure of lean feedback processes and appropriate actions. The roles and responsibility must be well aligned.
- Deployment and integration; in order to be successful, should the organization embrace the new way of thinking. Throughout the whole organization one must become aware of it. Sustainable management must be deployed into existing tools, processes, procedures, programs and values.

The Pathway maps the process toward sustainability

- Vision, values and policy; description of the ultimate objectives of the company's sustainability ambition. It identifies the strategy.
- Operation system standard; gives the managing processes the ability to follow certain standards and helps to achieve the long term ambitions of the company.
- Strategic planning for aligned properties; this helps the organization to prioritize and create focus on the things that matter most. Alignment is essential in order to achieve sustainability goals faster.

The Evaluators helps an organization to track its performance and progress. It also offers an opportunity to adjust when necessary.

- Indicators and goals; make the action as specific as possible. Gives the organization also a concrete element to discuss. It makes actions more tangible.
- Measuring and reporting progress; 'What gets measured, gets managed; what gets managed gets done'. Installing measuring, analysing and reporting tools will ensure an overview of actions and will create an incentive to achieve better. For inside and outside the organization it will create transparency on how the company tackles the sustainability challenge and takes its responsibility upon it.
- Stakeholder engagement and feedback; giving other the opportunity to review a company's performance will ensure a positive change. The company will get a higher rate of credibility as well as the opportunity to take a moment for self-reflection fuelled by the insights of others.

Appendix B. The Sustainability Management System Framework by Nawaz & Koç, 2018.

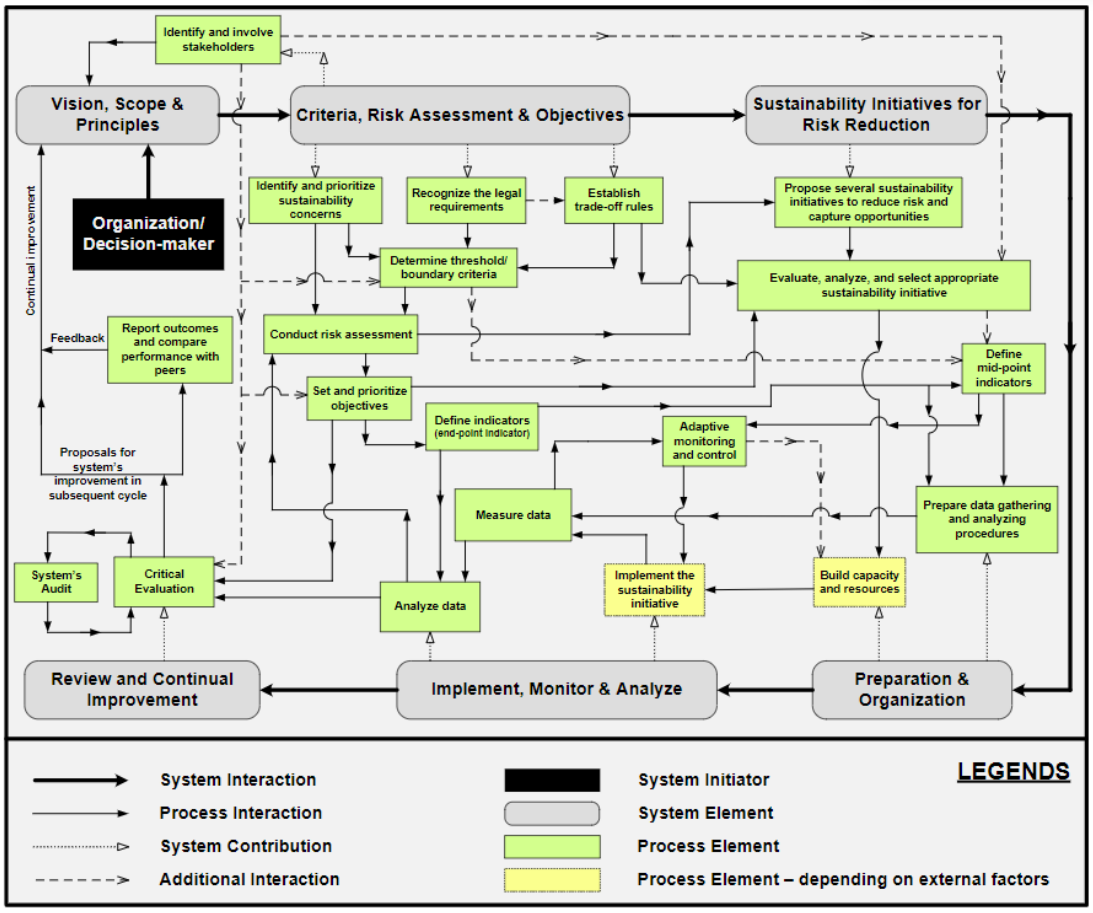

Figure 32. SMSF illustrated in the article by Nawaz & Koç.

Appendix C. The seven habits of effective sustainable leaders in an organization with their explanations on what aspects to consider when analysing certain traits of leaders.

Habit	Explanation
1. Systematic, interdisciplinary understanding	Bringing the root cause of sustainable challenges to the table. Only then people will start to see the essence of changing managing structures into more sustainable ones.
2. Emotional intelligence and a caring attitude	This habit considers the ability to unlock human potential in people. As a leader one can motivate people, but it is harder to create intrinsic motivation, this entail real inspiration.
3. Values orientation that shapes culture	It is important to consider the long term vision as a leader to create a higher level of credibility. This must be based on a value-based approach.
4. A strong vision for making a difference	Having a strong vision that can communicate a certain strategy or perspective on sustainable performance is inspiring for the surroundings of the leader.
5. An inclusive style that engenders trust	Being conscious that leaders need a team to be able to lead a sustainable change. Getting there by giving people the opportunity to explore on their own can help prove that they do not really need a leader to lead a sustainable change. It gives them confidence.
6. A willingness to innovate and be radical	Sustainable leaders admit that they need creative solutions to solve complex problems about sustainability.
7. A long term perspective on impacts	Paramount for sustainability it is important to think of long-term goals. With the experience that when one is given a long-term focus they will be less resistant to change and will adapt more quickly towards a sustainable change.

Appendix D: the story of integration of sustainability in the performance management system of OilCom based on finding from the research of George et al., 2016.

Institutional influences forced the company to invest in safety during the 1980s. From the introduction of safety within the industry, environmental impact assessments (EIA) were on the rise. This came from the company itself since they saw the essence of managing these issues. Furthermore, the Health Safety and Environment (HSE) management started to play a role in coping with new legislations that appeared in the countries OilCom would work in as well as safeguarding the aspects of HSE during work. It only was HSE management at that time and wider sustainability initiatives were not discussed on organizational level. Moreover, the decisions about what time and money is spent on which processes was called by the managing board. The distance between the HSE department and the rest of the company got bigger. With as consequence that the organizational structure around the HSE department was lacking. The business was only focussing on improving their operating performance and expanding operations. Luckily, the HSE department got bigger on its own expertise in the field and was able to compel structural procedures on how to tackle HSE issues. Thereafter, the HSE issues got implemented on a broad scale because of the market and industry that also got more aware of the risks to the workers and environment. With this growth of care, for the workers and the environment, the company saw a growing demand from stakeholders and the market to address sustainability within the company.

The interesting part about this transition is that the management of the company really saw the urgency when institutional pressure was exposed.
Furthermore, the cognitive transition in the company was seen as well. New employees who got new created jobs in the company had to train themselves to retrieve sustainability insights. They had to face the challenge to get the longer situated employees to understand the need to look into more sustainable solutions.
From 2000, the company experienced more external influences on questions about reporting and monitoring of their sustainability performance. This led to the creation of a corporate sustainability framework. Nevertheless, some barriers such as, less information and knowledge and less fitted personnel which evolves in the event that sustainable values were not incorporated by the company. Not even through assigning people as sustainability champions. As revealed later, these were not employees with the right knowledge on the sustainability challenge ahead.
A moment of change came from the involvement of HSE in contractual requirements regarding sustainability factors. This was a breakthrough in the accountability of the sustainability challenges addressed in the operations by the company. A shared accountability was formed by working together with suppliers and contractors to follow the rules and regulations among HSE standards. However, lacking the tools to apply and measure the performance was still a bridge to far. The appointment of a new CEO has led to a restructure with as consequence more support for the HSE and sustainability department. This resulted in a sustainability council that consisted of the vice-presidents and the heads of relevant business units. From here, a corporate strategy enrolled with short, medium and long term sustainability plans. The strategy examined the practices to embed the plans into the organization with the measures, monitoring, evaluation and achievement on sustainability goals and objectives. Another enabler here was the introduction of KPI's based on sustainability and HSE to evaluate their performance towards the companies' strategic path to integrate sustainability. Moreover, another action that supported the integration of sustainability was the introduction of yearly sustainability reports on actions and numbers of the performance of the past year.

To facilitate technical integration, data was collected of relevant parameters and shared with the whole company. As well as an HSE framework that must be used by each department to increase the HSE performance.
On cognitive level, initiatives focussed on changing one's mindset. Top management was educated by the HSE management team about the urgency of sustainability and its effects. This was useful since many people knew generally the consequences of unsustainable actions but do not know the companies' contribution or ability to act.

To conclude, OilCom has been tackling the integration of sustainability into their business for quite some years. Focussing on the technical, organizational and cognitive integration one can learn from their pathway. Currently, the organization has achieved a sound way of reporting its performances on GHG, energy, water and waste data. Moreover, monitoring, reporting and verification standards are future proof and reliable. To keep improving this, they have introduced a separate department that focusses on R&D to increase the positive sustainable impact. Their tasks are to look into alternative fuels, new methods to reach to sustainable stakeholders and discover new methods and technologies. And lastly, a social program is launched in order to integrate the sustainable values that the company pursues with its employees.

Appendix E. Overview of known environmental impact of Heerema Marine Contractors (HMC data, 2022)

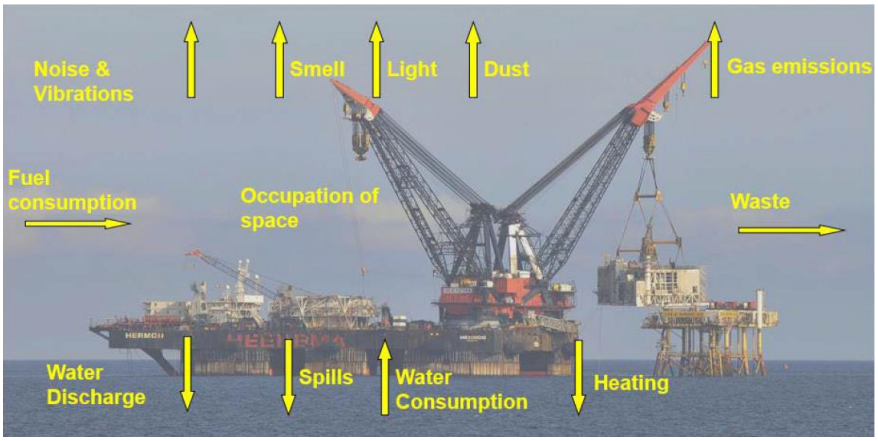

Figure 33. All the environmental impact indicators considered by HMC during operations on the vessels.

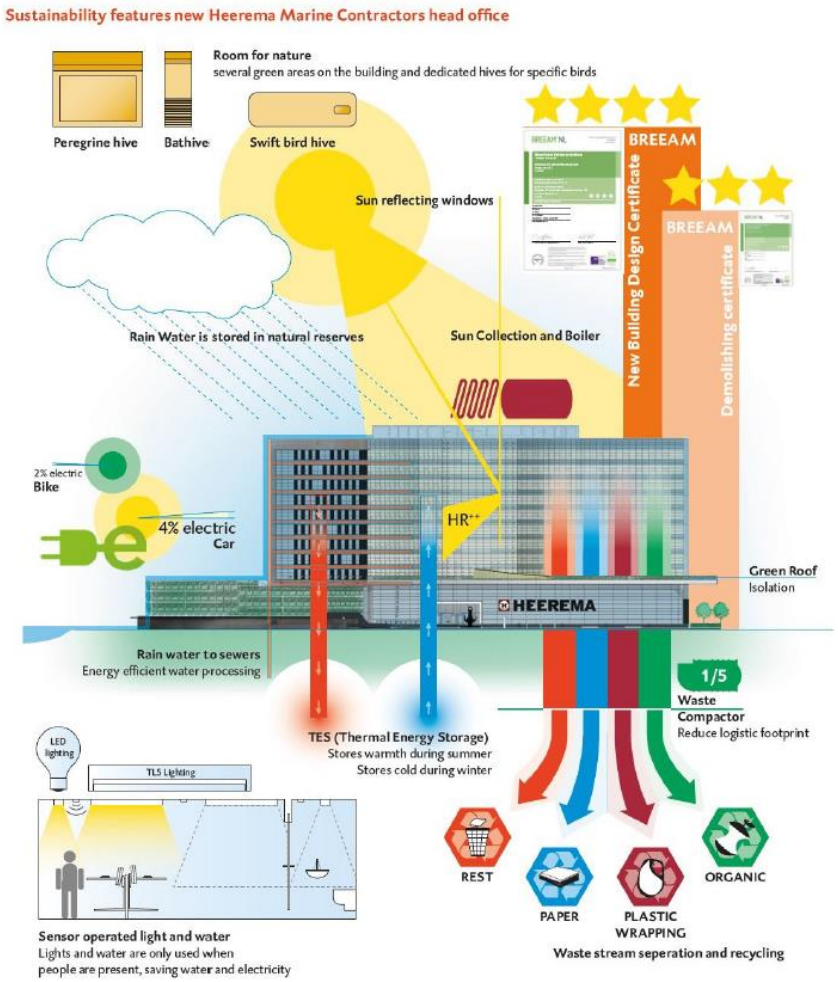

Figure 34. All environmental indicators and reduction measures in the HMC head office in Leiden.

Appendix F. Search terms used for literature review

Section 2.1	Section 2.2	Section 2.3
Sustainable behaviour	Managing sustainability	Environmental impact indicators
Factors of sustainable behaviour	Integrated management systems for sustainability	Marine environmental impact
Changing behaviour at the workplace	Sustainable management systems	Environmental consequences of shipping
Definition of sustainable behaviour	Sustainable behaviour in organizations	Performance indicators
	Analysing sustainable behaviour	
	Drivers of sustainability in organizations	

Appendix G. The semi-structured open-ended interview questions template

Explorative Interview, case study He-Dreiht project, July 2022
Client name: EnBW
Executed by Anniek Schreuder, trainee at HMC. Writing her thesis on support for Sustainability; designing an intervention that explores how to stimulate and support sustainable behaviour towards environmental sustainability.

Hello, thank you for your time.
With your permission, I would like to record this interview so that I can make a useful transcript to analyse important information for my research.

Goal of this interview
To understand how a project team works and how they include sustainability within their way of working on a project.
How you look at what project resources have an impact on the environment and how you cope with that. Besides, through analysing the output of this interview the researcher will be able to determine the key indicators on environmental sustainability that must be considered when analysing the performance on sustainability for a marine contractor.

Introductions

1. Introduction of researcher, background and experiences within HMC.
2. This research: main goal is to identify how sustainability can be supported throughout the whole organization. Creating awareness, inform people on the impact we have as a company on the environment.

Start of the interview
This to relate possible answers because of their background or years of experience at HMC.

1. What is your profession and role at HMC?
2. What is your educational background?
3. How long have you been working at Heerema?

General sustainability
To get a better feeling of how the interviewee thinks of sustainability. To discover where they place sustainability within their daily working basis. What is holding them back in becoming more sustainable and awareness of impact the operations of the company has on its environment.

1. How would you define sustainability? And environmental sustainability?
2. On a daily working basis, do you make decisions taking the sustainability aspects ambition of HMC into account?
3. Are you aware of the impact HMC has on it environment? And in what kind of measures do you see that?
4. What is holding you back to implement more sustainable aspects into your role/responsibility within HMC?

The He-Dreiht project

Personal role

Determine involvement in the project, explore what indicators the interviewee can influence or steer upon in the project structure.

1. What is your role / responsibility within the He-Dreiht project?
2. From what moment did you got involved?

Project Management structure

Getting to know the managerial structure of the project. How the team works together, how they decide certain issues in the operation of the project. Go/no go usage or risk management approach in decisions-making.

1. To whom do you report your work? And on what frequency do you report? Is sustainability mentioned?
2. How often do you get together with the HD project team?
3. Could you describe how the project meetings go? Discussions, who takes care of the calendar / topics to be discussed?
4. Do you feel that you are able to add your vision into those meetings?

Project

To get a better view on what indicators the interviewees themselves discovered in this project. GHG, Energy efficiency & management, Circular Economy and Life below Water, those are main categories on environmental impact. What certain operations influence the performance of those main categories. Influences: external and internal, costs, time, regulations. How to create more engagement with the topic sustainability; weekly updates, dashboards, performance competitions between projects.

1. What impact on the environment is considered in this project? What impact do you see?
2. How are these taken into account in the project? Are they measured? Does one keeps track of them?
3. What are the challenges of making this project sustainable? And what do you think are general challenges HMC faces in terms of sustainability?
4. What elements would you add to the project process to get more sustainability into the project?

Client

Differences in clients. To understand the relation of the client with how Heerema designs the operation of a certain project.

1. What are the main requirements of the client for this project? Which are sustainable related?
2. What are the accompanied challenges from those requirements? Could you also give examples of profit driven clients and clients who are sustainable oriented?
3. Are there sustainability performances reported to the client? How? How would you do this in the future?

Sustainability in an ideal situation

If you are willing to create sustainable values no matter in your work. What would you need to fulfil this ambition. Do people need more time, more people, more information?

1. How would you combine sustainability within your current way of working?
2. How would you like to be informed about your sustainability performance?
3. What could be a good incentive for you to adapt more sustainable solutions into your projects?

Ending

Thank you for your time and sharing your knowledge and experiences with me. The next steps in my thesis is combining the knowledge gained from the interviews into the conceptual tool / framework on how a MC should measure and manage the KPI's in order to create support for sustainability.

1. From this interview, who else do you think I should talk to?
2. If you have any further recommendation or comments, please feel free to reach out.
3. When I have concluded my final design, would you like to receive an email update on what I did with the input from the He-Dreiht project? This, to validate my research and make recommendations on the designed intervention of my research?

Appendix H. Elaborated explanation of thematic analysis of the open-ended performed interviews

Phase 1 – familiarize with the data
To start analysing the data, it is important to plunge in the data by reviewing the data. The collected transcripts will be reread and taking first notes on interesting parts that may contribute in a later phase are made. This starting point is important to get familiar with the data, and to start reading the data as data, this to go deeper into the meaning of words. Questions that the researcher should ask him/herself is whether how the participant explains their experiences with sustainability? What underlying assumptions are made? The most important part of this phase is to get familiar with your data and to reach to the specific parts that are relevant for your research question.

Phase 2 – Generate initial codes
This phase is about editing your data into codes. Codes are analyst specific, they do not have to be fully-worked up with explanations, the important aspect is that the analyst gets an idea of what the data means and how it is interpreted.

Phase 3 – Search for themes
During this phase, the data analysis is getting more and more shape. Searching for themes is necessary to capture the relation between the data and the opposed research question of this thesis. Searching for themes that comply with the given data collection is an iterative process that will follow from analyses.

Phase 4 – Review potential themes
This phase focusses on quality checking of the previous phases. Alternations upon checking whether your codes are in line with the assigned themes can be in the form of redrawing the boundaries of the theme.

Phase 5 – Define and name themes
Themes are defined in order to work through the data in line with the research objectives and questions of this thesis.

Phase 6 – Report findings
This phase results into conclusions upon the analysis of the data retrieved from the interviews. It will involve a common understanding of the topic addressed via the questions posed in the interview and unusual findings that need to be reconsidered in further research.

Appendix I. Organizational structure of HMC

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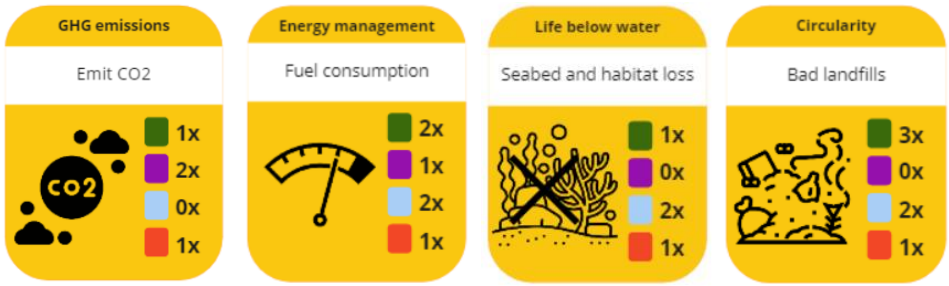
Appendix J. The Sustainable Behaviour game elements

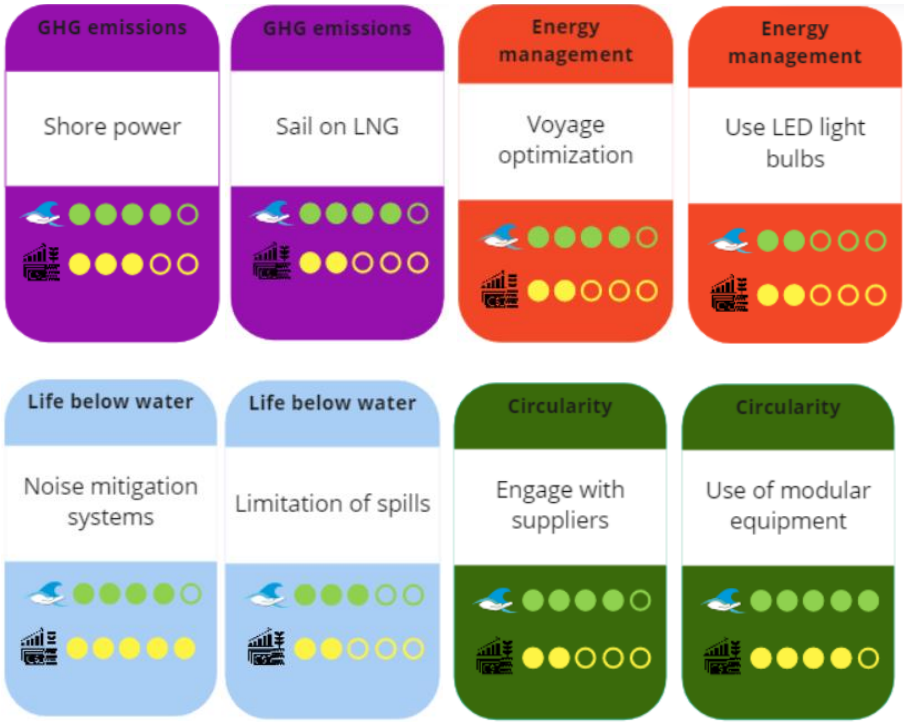
The IMPACT cards

In total there are 15 different impact cards in the game.



The ACTION cards

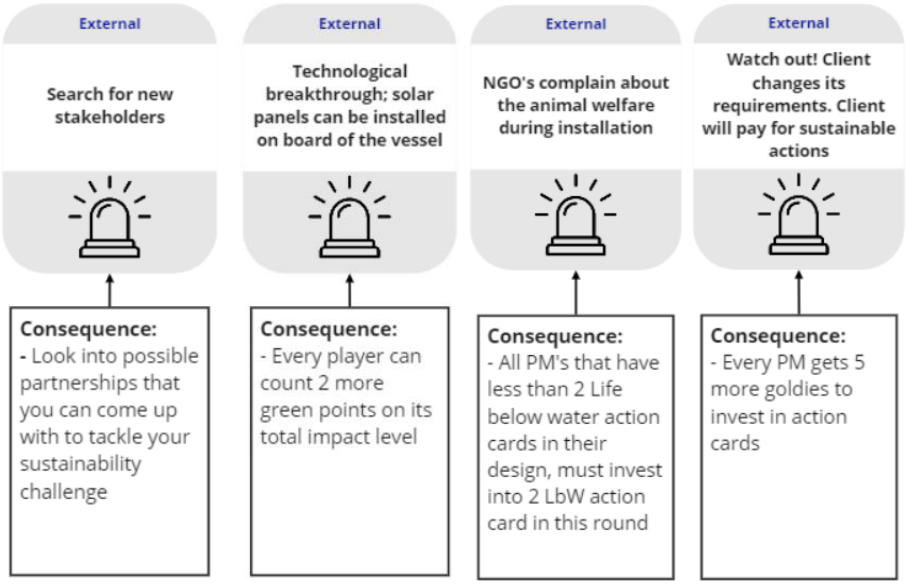
GHG emissions has 6 different action cards, Energy management has 10 different action cards, Life below water has 8 different actions cards and Circularity has 10 different action cards. To have enough action cards available for the game. All action cards are double printed. So players are able to both invest in 'Sail on LNG' since there are two action cards found in the game.



Appendix K. The Sustainable Behaviour game elements

The EXTERNAL cards

These cards are events that might occur during project design related to true events that may occur in real project design as well. After the external card is introduced, the consequence will be read by the CSO.



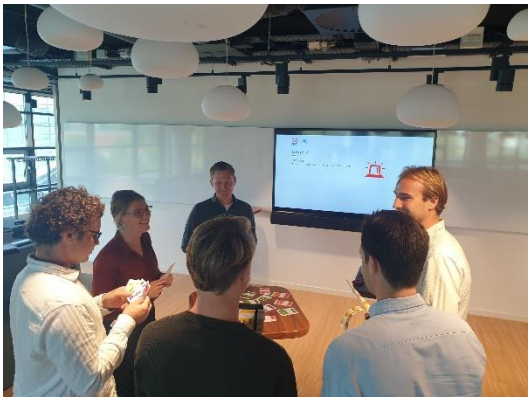
The GOLDIES

Currency with which the players were able to invest into actions.
Goldies are equal to money, time and knowledge that is needed to invent to ensure an environmental action is implemented into the players' No Limit project design. Each player retrieved 30 goldies at the beginning of the game.

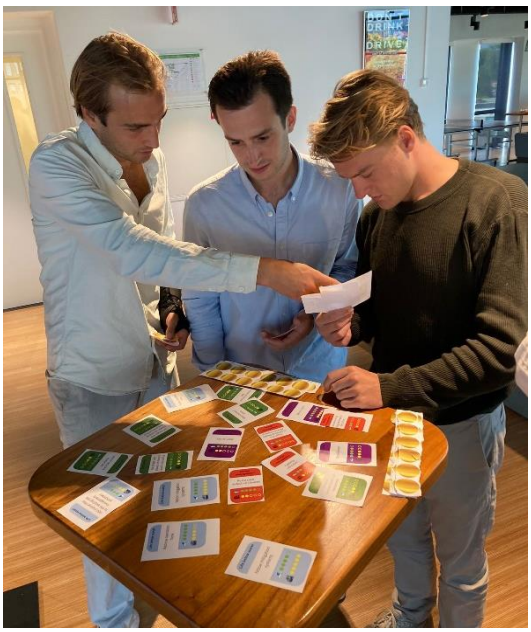
The GREEN POINTS

Per action, green points are assigned to the rate how much the action contributes to lower the impact on the environment. In the end, some green points may count double since they add up to the actions necessary to fulfil the impact cards. Other action cards that players have invested in also count to lower your impact level of the project.

Appendix L. Pictures of the demonstration phase. Prototype testing through interaction with the end-users.





Demonstration & evaluation phase of the prototype
Title: stimulate and support sustainable behaviour through gamification
When: Tuesday September 6 2022 10.00 o'clock
Where: In the bar area of the HMC office in Leiden
Participants: employees of Heerema, all working in the sustainability department.

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