DEVELOPING A FRAMEWORK FOR HYPER-COLLABORATION IN PORT ESBJERG

A thesis submitted per the requirements of the University of Liverpool for the degree of Doctor of Business Administration

By

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DECLARATION

I declare that this thesis has been composed solely by myself and that it has not been submitted, in whole or in part, in any previous application for a degree. Except when states otherwise by reference or acknowledgment, the work presented is entirely my own.

I confirm that this thesis presented for the degree of Doctor of Business Administration (DBA), has been composed entirely by myself has been solely the result of my own work and has not been submitted for any other degree or professional qualification.

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Denmark, 20. October 2022

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ABSTRACT

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Ports are nodes in vast networks, allowing for the transfer of various goods between sea and land transport. The Organisation for economic cooperation and development states that 'around 90% of trades goods are carried over the waves, and in this context, one may view the importance of ports. Hence, it was understandable why the European Union 2013 communicated the paper on ports as engines for growth, where it was stated that 'ports are vital for the functioning of the European Union'. In addition, the European Union announced the social dialogue aspects in the port sector and did in 2017 establish the framework for the provision of port services and common rules on the financial transparency of ports that were intended to improve the efficiency of the logistic networks, which implicitly would increase competitiveness of ports.

Port competitiveness is the epitome of this research study, which explores the social systems among the companies and the port authorities in Port Esbjerg with specific focus on the offshore wind industry. Port Esbjerg expand to benefit from the surge in offshore wind projects in Europe. To remain competitive, the companies in the Port need to invest in their capabilities to increase their activities. In praxis, companies must train their employees and invest in equipment to cater to the increased activity. Such correlated strategy presented the dilemma of coordinated decision-making. The action of the port administration and multiple companies had to recognise the opportunities in the offshore wind market and make their individual plans in symposium to support the growth of the activities. These actions should be self-regulating to build the continuum of joint decision-making in response to competitiveness, which coined the research idea developing a framework for hyper-collaboration.

The research study commences with an introduction to Port Esbjerg and the position in the offshore wind industry, while explaining the business / management problem and rationalising towards the aim and research question, which pivots on creating a framework for hyper-collaboration in Port Esbjerg. Then the research study continues with the literature review on competitiveness in ports, networks, clusters and decision-making in collaboration and the discussion on hyper-collaboration. The literature review revealed that port competitiveness was mostly considered with productivity, position, and price, albeit recognizing interaction within the ports. The function of ports depends on many companies in the ports, and their combined actions allow for productivity that influences port competitiveness. Hence, the structured knowledge gained from the literature review was supplemented by determining the social contagions and entrenched relationships developed over prolonged periods. The fuzzy mapping of this system was used to determine the companies and decision-makers I, as the researcher, needed to engage of Port Esbjerg through fuzzy mapping determining the social-formal-system.

In Port Esbjerg, the correlation issue between port competitiveness and the social-formative-system required a research methodology that allowed me to engage with companies operating with offshore wind, and which had profound effect on port competitiveness. Participative action research was selected, and empirical evidence was gathered though semi-structured interviews, actions cycles and observations. This research process allowed me to

understand the complexity when I had to orchestra coordinated decision-making with the companies operating within the Port. I performed multiple interactions and during the research, and found that judgments, emotions, and decisions were intertwined among the participants, who also was affected by contemporary issues in the Port. This constant evolving formative-social-system formed the basis of my engagement to seek to develop coordinated the decision-making required to develop the framework for hyper-collaboration.

Representing the Port Administration, I appreciated that leadership had to be exercised without formal power over the participants and therefore commenced by arguing for own envisaged solution. It entailed sharing resources, which I defined as some form of hyper-collaboration. Early in this process I realised that participants had little interest in pursuing my solution. I realised that without the formative power in the group, I had to observe, engage, and interact with the participants in their daily actions, learn about their decision-making abilities, and find solutions they would embrace. Therefore, the notion of a framework for hyper-collaboration remained the core pursuit of the research. I evaluated this to have a profound effect on the formative-social-system of the participants, and, thereby, the competitiveness of Port Esbjerg.

I considered hyper-collaboration as a collective effort to develop new ways of working together to the benefits of all the participants. In this context, reaching a consensus and observing and reviewing the participants' reactions was imperative. Several actions were performed that allowed me to observe the readiness to change among the participants, but also their ability to enact in certain situations and how such action influenced the other participants. In the process, I found my role in the group as the gatekeeper rather than the initial envisioned leader, and this also depicted the relevance of reach from the position of the port authority. I found that participants reached positively towards opportunities, while also perception of risk could create coherence, and to systematize the approach the ‘Business Platform’ was created and the pre-curser for the framework for hyper-collaboration was determined. Verifying the pre-curser was performed through engagement with the participants and this eventually allowed for joint development of the framework for hyper collaboration in Port Esbjerg.

In sum, this research describes how participative action research can be used to identify an improved solution to an envisioned social phenomenon, by developing a framework that systematized the dynamics, that allow for the group to act jointly towards perceived opportunity. This framework had to embrace the intertwined group of participants and predict their interaction, but also understand their capability to enact and thereby participate in the change towards hyper-collaboration. Thus, the framework for hyper-collaboration was found to commence with an opportunity, and defined issues, solutions and gate-keepers before negotiating power-structures and aligning emotions, belief and behaviors prior to engaging in collaboration and obtaining consensus for enactment which will result in hyper-collaboration.

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List of Acronyms

CAPEX	**Capital Expenditure**
CEO	**Chief Executive Officer**
EU	**European Union**
GW	**Giga Watt**
MW	**MegaWatt**
OECD	**Organisation for Economic Co-operation and Development**
OEM	**Original Equipment Manufacture**
OWF	**Offshore Wind Farm**

List of Definitions

Collaboration	**The action of working with someone to achieve a certain outcome in favour of both parties**
Clusters	**A group of companies that is positioned in the same area and serving the same industry and thus part of an industrial ecosystem**
Formal Social System	**A group of companies or individuals that formally are connected by their services within an industrial ecosystem**
Hyper-Collaboration	**The phenomenon of achieving a mutual advantageous situation in defined setting that possesses certain attributes of a complex system**
Networks	**Nodes that are connected as they service the same purpose in a flow of goods, services, information or knowledge**
Port ecosystem	**The system of the external environment in which the port operates visualized together with the function with the spatial cluster within the port and the decision mechanisms.**

CHAPTER 1, INTRODUCTION

This introduction describes Port Esbjerg and the aim of the research to explore the potential of offshore wind, and why discussing and realising this potential requires detailed consideration and action research.

1.1 About Port Esbjerg

Port Esbjerg was established in 1868. Initially, it exported livestock to the United Kingdom, which food products on the same routes replace today. From the nineteen twenties, it also grew as a fishing port, and today, the processing of fish, fishmeal, and fish oil still takes place. Since the late sixties, the Port has serviced the Danish oil and gas industry, and since 2002, it has grown its presence in the offshore wind market. Today, the Port represents a spatial cluster of 200 companies employing more than 7.500 people.

The main income of the Port is from land leases, cargo tariffs, and ship dues. In 2020, the three most significant business segments were offshore wind, which accounted for 27%; general cargo, which accounted for 25%; and modular goods, which accounted for 10% of the earnings. The position of the Port in relation to the markets depicts the growth possibilities, and with the ongoing plans for offshore wind in Europe, this segment remains a priority. The offshore wind industry has installed twenty-five gigawatts of capacity in Europe during the last two decades. However, over the next decade, this number will increase to 148 Gigawatt (4C offshore, 12/2021). The data below shows the size of the wind farms to be installed over the next five years, which illustrates that it will be necessary for Port Esbjerg to focus on its ability to compete for projects among ports in Germany, Holland, and the United Kingdom.

Country/Year	2021	2022	2023	2024	2025
Denmark			900 MW	200 MW	1.400 MW
Germany	300 MW	300 MW	1.000 MW	1.800 MW	1.000 MW
Holland	800 MW	1.500 MW		1.400 MW	
United Kingdom	2.500 MW	1.200 MW	4.000 MW	3.200 MW	2.800 MW

Table 1 – OWF Scheduled

The surge in the offshore wind market paves the way for opportunities in Port Esbjerg, but it requires investment in capabilities and competencies for the spatial cluster to remain competitive. OECD's handbook on constructing composite indicators (OECD, 2008) provides factors affecting clusters, which requires relative interdependence and collaboration for implementation. For Port Esbjerg, the offshore wind segment provides opportunities only if companies collaborate in the rapid growing offshore wind market. With collaboration the possibility for co-evolution will appear, and collective competitiveness may occur. Such co-evolution requires coinciding decision-making and same goal-setting.

To achieve beneficial collaboration in the Port of Esbjerg there is a need to engage with the companies affecting the competitiveness, but it is also important to understand the limitations imposed on the operative environment. In this context Port Esbjerg is governed by the Regulation of the European Parliament and Council establishing a framework on market access to port services and financial transparency of port, in addition to the Danish Port Act.

In article 15 and 16 in regulations from the European Parliament and Council port authority is required to establish a port users' advisory committee and consult stakeholders on coordination of port services and the efficiency of the administrative procedures. The requirement to consult the port users and stakeholders does not exist in the Danish Port Act, but as Port Esbjerg is a registered as a self-governing port, this prevents the port authority to conduct various services, hereunder stevedoring. Combined, the governing rules dictate that I as the CEO, representing the port authority, was required to engage with the advisory board at some point during this study and at the same time the findings were restricted to certain activities.

Consequently, I did not have the option to increase competitiveness by establishing a port owner stevedore company, nor did I have the possibility of lowering the cargo tariff or ship dues for the offshore wind industry without consulting with the advisory board. Such limitations in my strategic option notion of hyper-collaboration where companies and port authority find new sustainable ways of working together to increase competitiveness. Finally, I realized that when framework for hyper-collaboration had been developed together with the participants, I also had to gain the acceptance of the advisory board. This process of finding solution and gaining acceptance depicted the complexity of the study, as any proposals for change unavoidably world create both desired and undesired responses, which I had to manage and reach consensus.

1.2 The research idea

The market situation for offshore wind, therefore, describes the precedence of conducting this research. The initial thought was that sharing specialised handling equipment between competing companies would increase utilisation, decrease cost and improve the overall competitiveness of the Port. Exemplified, when discharging blades for wind turbines, there is a need for stevedores, dockers, cranes, and reach stackers. The Port owns the cranes, and dockers are day laborers, wherefore this cost remains the same for all stevedore companies. Therefore, the stevedore can only compete on the price of supervision and handling equipment, and by sharing these resources, they could jointly be more competitive. Therefore, discussions with stevedores had been ongoing for prolonged periods, but they would not participate in a solution, as they envisaged that this would allow new companies to enter the scene and thereby increase competition. Conversely, the discussion also revealed the issue that stevedores needed to invest in their capabilities to increase the activities within the offshore wind segment. The problem would affect the development of the Port if stevedores did not enhance their capabilities and prepare for the increased future activities.

In port operations, the possibility of collaboration, require interlinked decisions and acting coherently among stevedore companies and the Port. This confirmation process required me to consider how to change praxis and obtain collaborative dynamics by conceptualising norms, beliefs, and biases, which may affect decisions-making and implement a new way of working together. This idea is antithetical to supply chain collaboration, which is about overcoming differences to enhance efficiency in existing relationships. My research idea for Port Esbjerg was about overcoming tensions and forming partnerships for collaborating to increase activity within the spatial cluster. The

theory considers the port as an ecosystem where collaboration will enhance competitiveness, and this differs from the perception of companies compete for individual benefit. The essence is that by collaborating in port eco-systems, market share can be increased in growing markets, and this would benefit the port spatial cluster. The research's purpose was action research within the relationship of the forming and acting, among decisive companies within the offshore wind segment, portrayed by the pre-assembly and load-out activities, to develop a framework for joint decision-making and collaboration.

Emphatically, the collaboration on the offshore wind possibilities for the companies in Port Esbjerg requires common goal setting, but the market outlook does not automatically generate a similar impact on decisions. Therefore, collaborative efforts needed to build uniform intentions among companies to develop their capabilities. This collaboration meant that each company needed to take a strategic decision to invest in its future position within the offshore wind segment in Port Esbjerg. I envisioned the basis would be a similar worldview.

In Port Esbjerg, I observed that some companies influence the competitiveness of each other, and the paramount competitive factors are safety, cost, and time leading to effective port operations. The port authority is the infrastructure owner, supplying the areas for lease and quays needed to conduct the operations. Still, the competence of stevedore companies, dockers, and the availability of cranes and other handling equipment affects the effectiveness of the Port. This interdependence between the port authority and the companies indicates that improving one will affect the other. The fact that companies and Port are already interlinked adds to the complexity, as the situation in the Port would need to change from one form of collaboration to another. This change required established practice to change. This research aims to develop the framework to allow this to happen.

1.3 Aim of the research study

This research study explores how a framework can be developed for the companies operating within the offshore wind segment and the port authority that may improve the competitive position of Port Esbjerg. However, implementation will be complex because many companies will require deep collaboration. Moreover, these companies already have a history and exist within a culture with established dynamics and unending tensions. This situation depicts that selective participants within these companies are intertwined in their past transactions in the formative social system in which they are an integral part.

To cater to collaboration to enhance activities within the offshore wind segment, I propose a framework that would incite companies to work together and expand their activities in conformity with the opportunities in the offshore wind market. This framework would provide certainty for the port authority's strategic decisions, ensure that activities followed the planned port expansion in due course, and gain the desired socio-economic effects.

From a strategic perspective, the framework could increase competitiveness and create more activities. This situation could be achieved by reducing costs and growing activities through collaboration among the companies in the Port, albeit producing this practice would also change the role of the port authority.

This change in the portscape is imperative for ports that service the offshore wind industry, as the operations require continued developments. This is best explained by comparing container terminals with offshore wind operations. In the former, the competitiveness in high-speed loading and discharging of containers, which always have exact sizes of 20, 40 and 45 feet. As a result, the investment in port infrastructure and cranes can depreciate over many years.

Contrary, in the offshore wind industry, the size of the wind turbines increases rapidly, and continuous investment in port infrastructure and handling equipment is needed. At the same time, also competencies frequently must be developed. This comparison adds to the understanding of the changing role of port authorities, where the required level of collaboration is proportional to the port activities, which is correlated to the markets served by the Port.

Thus, the research study must consider how collaboration, clusters dynamics, complexity and hyper-collaboration affect the situation between the offshore wind industry and port competitiveness and seek to uncover how the formative social system influence port competitiveness.

1.4 The role of port authorities

Ports are essential infrastructures for the economy, as they represent nodes in the networks that allow for receiving and shipping goods by the sea. The European Union also adopted this confirmation after the economic crisis in 2009. Here, it was noted that to reactivate the economy, the trade between the countries should increase, and the effectiveness of the ports paved the way for the notion of ports as engines for growth. The European Union isolated the main challenges as port performance and issues on the organisation of labour in ports (European Commission, 2013).

In Europe, ports are regulated through Regulation (EU) 2017/352. This regulation describes the activities port authorities can engage in and how ports should interact with the companies operating within the port. The regulations apply to the ports included in the network labelled ‘Motorways of the Sea’. It is, therefore, possible to review the regulation, its implementation, and the learnings in the context of port management. Baird (2007) made the status of the Motorways of the Sea five years after the European Union introduced the concept and noted behavioral issues was a hindrance for efficiency. Port operation is highly regulated, and authorities must overcome inefficiencies to influence competitiveness. In addition, they must ensure collaboration and develop frameworks that benefit the individual companies and the port authorities.

In this context, it was plausible to evaluate how embedded the supply to offshore wind is in Port Esbjerg. Furthermore, I had to find out how the companies recognised their position in relation to the opportunities presented and their intentions to invest in their capabilities. I recognise that the companies in the supply chain to the offshore wind industry directly influence the socio-economic effect gained in Port Esbjerg's spatial cluster. Hence, the planned framework was also intended to create certainty in the strategic decision of port and cater for the operation in the offshore wind segment.

1.5 Operations and Competitiveness in the offshore wind segment

As the operation of ports varies, I describe the activity of discharging and loading cargo through the port supply chain actors to understand the circumstance of this research. The cargo owner will engage the shipper, a stevedoring company that will arrange the loading or discharging operations. The stevedoring company will arrange for supervisors, dockers, cranes, and other handling equipment required for the operation. The cost of the service from the stevedore company, the hinterland connectivity, the cargo tariffs, and ship dues are therefore all part of the cargo owners evaluation of the port. Further, the efficiency of the operations weighs heavily, wherefore stevedoring activities are intrinsically linked to the competitiveness of the ports.

The activities in the offshore wind market intertwine with the development in the size of offshore wind turbines and the number of planned offshore wind farms. Therefore, the ports catering for this segment continuously need to develop infrastructure. WindEurope (2021, p.8.) stated in their report considering the 2030 vision that “To deliver the offshore wind expansion set out in the EU's Offshore Renewable Energy Strategy, Europe's ports must expand and add new infrastructure." Conversely, the attractiveness of the offshore wind industry is a duality between the companies operating within the port and the port authority, and any collaboration that may increase efficiency or reduce cost allows for leadership in the competitive landscape with other ports. This situation may be developed by creating a framework for joint decision-making and collaboration that will benefit the individual companies, the Port, and the whole complex port system related to the installation of offshore wind farms.

The overall purpose of the research is to increase activities in Port Esbjerg within the offshore wind segment. Over the next decade, the surge in offshore wind allows the Port to gain market share and activities in this key segment, only provided that the companies involved remain competitive, enhance their capabilities and act in symbiosis. This phenomenon, I envisaged, entails several solutions developed by the companies operating within the Port. The solution could provide formalised structure for collaboration, which would provide relative interdependence and eventually a self-regulating collaborative system. Furthermore, based on action research, this also portrays the shift from theoretical models of action to the praxis of systematising developments in the port ecosystem.

To conclude, the research explores if a framework can be established for companies operating within the offshore wind segment in Port Esbjerg to collaborate in such a way that it will increase the competitiveness of the Port. The

surge in the offshore wind industry over the coming years portrays an option for the Port and companies to expand their activities, but this will be complex because:

- The was presently no indication of collaboration, and history depicted that relationship had formed from years of rooted actions.
- The relationship among companies has resulted in entrenched norms, behaviours and decisions-making.
- The role of the port authority has traditionally not been to encourage collaboration or be actively involved in the strategic decisions of the companies operating within the Port.
- The Port is one of the epicentres of wind in Europe, and together with the companies, there is extensive knowledge and experience, which may result in a biased view of how the offshore wind market should be served.
- The interaction between the companies is both formal, in the form of contracts, and informal due to developed relationships. The formative power among the participants therefore varies and evolves during the research.
- The issue of increasing port competitiveness through collaboration, as envisioned by the port authority, may not be recognised by the companies. This problematises both actions and changes needed to implement the intended framework.

1.6 The management / business problem

In Port Esbjerg, my role as the Chief Executive Officer is to increase competitiveness and, in doing so, assemble collaboration by involving the companies in essential decision points. Weick (1988) stated that 'as forcefulness and ambiguity increase, enactment is more consequential, and more of the unfolding crisis is under the direct control of human action'. Provided that Weick's (1988) argument holds, the COVID-19 crisis may have provided a window of opportunity to ignite collaboration and set forth new rules of engagement between the companies and port authorities.

These actions of the Port would enthuse the companies to engage in discussion on worldview leading to a common goal setting. To engage the companies towards a similar worldview, the consensus of the future situation and the opportunities for the individual company needed to exist. I found it challenging to obtain alignment in the strategic intent of both Port and the companies, as history suggested that individual actions earlier had distorted relationships and fracture lines had emerged. This social system added to the complexity of this study, where the actionable knowledge described in this thesis was to create a framework that allows for competitiveness developed through collaboration.

However, empirical evidence indicated that the decision-making was affected by individual situations and their view on opportunities. Brandt et al. (2017) argued that worldviews affect emotional reactions, psychological well-being, and negative evaluations of others. Such emotions also prevailed in the Port when evaluating the relationship between the Port and the companies. Interviews held with the advisory board members epitomised the situation. Ninety per

cent believed that their companies would engage in new business areas from 2025 to 2030, but only seventy per cent considered the activities to be in Port Esbjerg. Consequently, the idea to create a framework for joint decision-making and collaboration matured. I had to consider the business rationale.

The strategy for Port Esbjerg is to maintain the market share in offshore wind operations and remain one of the epicentres in Europe. However, these future business possibilities, presented by the surge in offshore wind, could increase activities in the Port significantly and, in doing so, provide opportunities for the companies operating within this segment. This situation dictates that the companies working within the offshore wind segment in the Port must invest in their capabilities. Therefore, the strategic plans of each of these companies must coincide with those of the Port and vice versa.

In sum, the strategic decisions of the port authority and companies must be interlinked when considering port activities in the offshore wind segment and pursuing interests that could underpin such strategic direction. This situation requires a shift from the present equilibrium to a situation where port authorities and companies seek to increase their activities and simultaneously enhance cost and efficiency, intrinsically linked to competitiveness.

Here, one should note that the competitive environment in ports often presents the antithesis to conventional business thinking, where companies fight for favourable market positions with the result that some will prosper, and others will disappear. Activities in ports are intertwined, and companies typically operate within several segments within the boundaries of the Port relationships are subtle depending on factors beyond cost and performance. Such factors may be exemplified when dockers are inefficient. The consequence would be that the overall competitiveness of the Port is directly affected, while the situation needs to provide the possibility to change dockers.

My prognostication is that the Port and companies must find new ways to add value and increase competitiveness. Interaction between Port and companies to engage in joint efforts will create operating rhythms that will improve collaboration. The result could be sharing resources, cost and risk reduction measures or unified competence building. My initial notion was that a similar worldview was required among the participants to influence perception. In doing so, I assumed that homogeneity among stakeholders would supersede any quasi-perception and thereby logically ensure consistent decision-making in favour of planned strategic direction.

As the CEO of Port Esbjerg, I have an integral part in strategy implementation and, hereunder, the pursuit of growth within the offshore wind segment. However, I recognise that the companies affecting this situation operate in polycentric decision patterns which display self-governance and resilience to change. Yet, I have no formative powers that allow me to direct strategic decisions for the companies. Therefore, I realised that the Port had to develop a collaboration system to influence the companies' decision-making. In the formative social system comprising Ports

and companies involved in offshore wind activities, I would pursue actions in conformity with each company's capabilities, competencies, and possibilities. Therefore, I am confident that the research could develop a framework for collaboration.

Nevertheless, from a strategic perspective, the collaboration among the companies should be more comprehensive than a single event. My idea was, therefore, to develop sustainable collaboration driven by common belief, perception, and understanding, and this had to be self-regulating while at the same time enhancing the collective competitiveness of both the Port and companies. The management problem was creating self-regulating collaboration to increase competitiveness for offshore wind activities within Port Esbjerg, which directed me towards the research question.

1.7 Research Question

To structure the emancipatory research question for collaboration in Port Esbjerg, it became necessary to consider how the port ecosystem influenced the formative social system of companies in the offshore wind segment.

This study uncovers opportunities for the offshore wind segment in Port Esbjerg and explain how this affects the decision-making within the formative social system. From an epistemic reflexivity standpoint, this advocates collaborative research while acknowledging the realism view among participants. Such multidisciplined action research must be performed in the context of the issue, situation and environment. Further, it acknowledges that port ecosystems are based on the evolution of socio-economic factors, and various companies may affect the formative social system. The question remains how port authorities engage with companies to increase port competitiveness.

Consequently, this study aim to create a framework that would make the phenomenon of self-regulating collaboration between the port authority and the various companies required to conduct offshore wind operations within Port Esbjerg. The phenomenon of self-regulating collaboration requires an innovative formative social system that can adapt to new situations, exemplified by the constantly evolving offshore wind segment.

In context to the management/business problem, hyper-collaboration appears relevant, but innovation in an ecosystem is bespoke, and the result is limited to the sphere of the decision-makers within such a system. Hence, the term hyper-collaboration can be defined as the phenomenon of the competitive ecosystem, as implicitly suggested by Kolk et al. (2018). Still, multiple facets of ecosystems depict that hyper-collaboration should be refined for each ecosystem. For the business problem in Port Esbjerg, hyper-collaboration shall ensure that collaboration in the formative social system is self-regulating.

The business problem, therefore, exhibits elements of complex adaptive systems, where it is an inevitable factor that concludes self-regulating behaviours. Chan (2001, p.3.) concluded that there are specific attributes to the complex adaptive system, which comprised that there is "there is no single centralised control mechanism that governs system

behaviour". This implies that a decision by one part will influence all other related parts, albeit not in any uniform manner.

The relative emerging interdependence between hyper-collaboration and the complex adaptive system could therefore be epitomised by this study involving the formative social system for offshore wind activities in Port Esbjerg, which defined hyper-collaboration as 'the phenomenon of achieving a mutually advantageous situation in a defined setting that possesses certain attributes of a complex system'.

The management/business problem defines the requirement to interact within the complexity of the defined formative social system, which is an integral part of the port ecosystem and is affected by the external environment. This situation requires a framework that can contribute to the desired outcome of changing the current equilibrium to an emerging order of interdependencies and conditions that will ensure that competitiveness remains sustainable. This allows me to define the research question: what is the framework for hyper-collaboration in Port Esbjerg to achieve a competitive advantage in the offshore wind industry?.

CHAPTER 2, LITERATURE REVIEW

The literature review aims to investigate theory relevant to ports and construct strategic collaboration and partnerships that lead to decision making. The approach is combined to inform how action research can proceed. It is noted that different paradigms exist in the literature – e.g. Porter (1998,2000) on clusters normatively declares that clusters have strategic power. In contrast, complexity and partnership theory tells us how much more socially constructed and dynamic such relationships are at a more micro level and over time.

2.1 Structure of the Literature Review

This literature review commences by identifying and discussing research on the competitiveness of ports. Then it evaluates factors within the port operations that affect competition before considering how ports and companies can enhance competitiveness through collaboration. The review shifted from port literature towards collaboration, networks and clusters theories in this context before drawing on complex system thinking. I then evaluate this in context to the port authority and companies operating within the spatial cluster of Port Esbjerg. Finally, this integration of various theories leads to a discussion on practices, which I may use as drivers, barriers, or benefits to hyper-collaboration. It is acknowledged that ports are essential network nodes specific to individual activities. Therefore, in lieu of particular literature on hyper-collaboration in ports, the phenomena is reviewed in other contexts and situations, while other forms of collaborative strategies are explored. Partnering within networks is therefore explored from the perspective of port competitiveness.

2.2 Approach to the Literature Review

The broad categorisation of quantitative and qualitative data needed for this study is further scrutinised in the literature review for the data collection method for analysis. In the formal social system study, the proper authority rests with the majority, indicating that commonalities and consensus pave the way for finding answers. The same argument is found in data analysis, where this literature review commences with a query search in Business Source Complete and industry specific databases. Commensurate, the literature review displays the narrative assessment which grounds the study in the context of the research question. The reviewed literature's action, process and outcome are described below in five sequences.

	Action	Process	Outcome
1	Discuss the context of ports and competition, which is integral to the business/management problem	Search University Library for Port and Competition. 20 articles sourced	Confirm the competitive factors and understand the external environment in which port compete
2	Discuss the competition in the networks in which the port intrinsically operate	Search University Library for relevant articles in context to Networks and Competition	Understand how ports may be competitive in networks and if the function of the spatial cluster within the port affects the situation
3	Discuss the competition and the idiosyncratic culture of collaboration within clusters in relation to the offshore wind industry, which relate the literature to the research aim	Search University Library for relevant articles in context to Cluster and Competition, and simultaneously consider articles and industry report for the offshore wind industry	Conceptualize the port system, when considering the competitive factors detailed in the literature and the external environment in which the port authorities act as embraced by the network and cluster theories.
4	Evaluate the dynamics in collaboration and the decision making to understand how the situation within the port could be affected	Search University Library for relevant articles in context to decision making and gather data specific to Port Esbjerg, which will allow to model port cost and efficiency for the offshore wind activities and verify if collaboration could increase competitiveness	The literature review create a conceptual path that depicted the possibility to increase efficiency with collaboration and affect competitiveness of the port linked the management/business problem with the research question. To make this process sustainable if was needed to evaluate how hyper-collaboration could be achieved.

5	Understand if hyper-collaboration can be build within Port Esbjerg and evaluate the impact	Search University Library for relevant articles in context to hyper-collaboration and articles that may discuss how social systems are determined and affected.	Link the management / business problem of port competition to the research question and finally the research aim and conclude on the port ecosystem in which I had to exert my action research

2.3 The Intertwined Nature of Port Management, Competition, and Operations

The learning from the port operations in context to implementing the change towards Motorways of the Sea (Baird, 2007) depicts that successfully implementing this framework depends on creating incentives. In this context, the legislative driver will not suffice without recognising the importance of efficiency through cooperation or seamless interaction of systems and activities between the ports. Jogovic et al. (2011) acknowledged these issues for port management for short sea shipping in Croatia. Here, Jogovic et al. (2011) considered the perception of maritime transport, creating an intermodal chain, and difficulties concerning active participation in port systems and standardisations of documentation procedures were considered barriers to successful implementation. Contrary, Janic (2007) offered calculations of the cost of modular shipped cargo and implied economies of distance, which depict that ports' competitive advantage correlates to their position in the logistic network. However, the question remains if this learning of port management is specific to short sea shipping or can be used in general terms and, therefore, also applicable to the offshore wind industry.

Wu and Yang (2013) also discussed the principle of the 'Motorways of the Sea' and its possible implementation in China. Wu and Yang (2013) noted that the fundamental of the correct ships, their management, and safety should be factors considered in enhancing the model. The argument from Wu and Yang (2013) depicts that port efficiency has several dependencies and the port authorities are not in control of all these parameters. Arof (2018) concluded the successful performance of short sea shipping and compared these to real situations in Southeast Asia. Arof (2018) noted that applicability should be considered case-by-case due to individual peculiarities. The overarching criteria were proposed by Zagaljic, Tijan, Joguvic, and Joguvic (2019) in their review of the implementation of the 'Motorways of the Sea' in Croatia. Zagaljic, Tijan, Joguvic, and Joguvic (2019) noted the three criteria groups: infrastructure, interaction, and administrative-political system.

Yap et al. (2006) discussed the positioning of container ports in South East Asia in interaction and administrative-political systems. Yap et al (2006) stated that competition on efficiency is a driver of cargo throughput and argued that 'as ports are just a single node in the international logistics chain, they have to bolster their hub position continuously by forging closer links with their hinterland. Lee and Lam (2015) also researched competition in container ports by evaluating the ports' development and service. In addition, they considered integrating the port and shippers through information technology systems. They argued that the effectiveness of port service quality is related to location, efficiency, and interaction with the port users. Lee and Lam (2015) research found similar developments in the major container ports analysed. They found identical qualities but offered no correlation to the competitiveness of the ports in context to other ports. Hassel et al. (2013) progressed this view when concluding that 'the underlying assumption

in port competition used to be that ports essentially vie among each other while stating that more recently port competition is unfolding between logistic chains. The inter-port competition was elaborated further by Bae et al. (2013) when considering the duopoly model for containerised transhipment cargo and concluding that 'the shipping lines decision in several port calls is contingent on the port's operation cost. Bae et al. (2013) explicitly acknowledge the importance of the conditional factors of the port. These factors comprised the essential services of shippers, stevedores, dockworkers, cranes, handling equipment, tugs, actors, and pilots needed for the port call and to conduct loading and discharge operations.

Commensurate, for ports operating within the modular and containerised segments, there is consensus from the research of port competition regarding location, effectiveness, and engagement with the supply chains. This agreement depicts those ports may increase competitiveness from factors outside the direct control of the port, illustrated by hinterland connectivity and efficient logistic networks and infrastructure. These connections raise questions on how ports' competitive factors should be measured when there is consistency that ports are part of supply chains and thus a more comprehensive network. In the context of port success rate, the conventional measures are cargo throughput and the number of ship calls, while ports also can measure the social-economic impact on gross domestic value. Munim and Schamm (2018) studied the transport economic literature over three decades and concluded that port infrastructure and logistics performance directly correlated to the economy's growth. Lakhmas and Sedqui (2018) further stated that ports as development actors could produce their development and stated price, efficiency, and network as instrumental factors in achieving this, albeit the factors may also be considered general operational performance parameters. More specifically, Ferretti et al. (2017) 's work may be viewed as a balanced approach to measuring port performance, reflecting on the pillars of economics, value, marketing, sustainability, operations, and governance.

All ports serve the same receiving and shipping goods from an all-encompassing view. Still, the literature on port competition raises whether there is consensus in understanding the port competition. This learning depicts the need to consider crucial determinants for port competition through the literature review by evaluating the content of various literature concerning multiple ports, regions, and types of cargo, summarised in table 2.

Factors/Authors	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
Productivity (turn-around time, berth availability, congestion, etc.)		X			X	X	X		X							X				
Position of the Port, located in the network of ports	X					X	X	X	X	X	X	X					X	X	X	
Price of the Port and the services		X			X	X	X	X	X				X	X	X	X		X		
Interaction with companies within the port to improve transactions										X			X		X		X			X
Hinterland corrections and supply chain integrations	X			X	X	X	X	X	X		X	X		X					X	X

Table 2 – Literature Review

Legend:

A: Hassel et al. (2013) B: Bae et al. (2013)	C: Munim and Schramm (2018)	D: OECD/ITF (2008)
E: Song et al. (2016)	F: van den Bos and Wiegmans (2018)	G: Haralambides (2015)
H: Choen et al. (2018)	I: Xu et al. (2018)	J: Merkel (2017)
K: Garcia-Alonso et al. (2019)	L: Yap, Lam, and Nottebom (2006)	M: Yu, Lee, and Wang (2017)
N: Kenyon (1970)	O: Merkel and Sløk-Madsen (2019)	P: Tovar and Wall (2019)
Q: Witters and Ivy (2002)	R: Balci et al. (2018)	S: Witte et al. (2017)
T: Santos and Soares (2017)		

The literature on port competition display scarcity on the effect that interaction among companies operating in the port has on the competitive advantage. The concept of collaboration discusses activities of port authorities. Merkel and Sløk-Madsen (2019) discuss the situation in Danish ports in the context of the governing legislation, where they discuss the potential greater freedom of ports to engage in port services. This argument depicts the dualism, which may explain why research on port competition has been segmented to internal and external operational factors, comprising productivity, price, position, and hinterland connectivity. These factors are also emphasised by Haezendock et al. (2018) in their port hinterland matrix, indicating that ports and service companies can obtain high prices for activities that cannot be easily shifted to other ports. The research on ports describes the current scenario compared to the markets the ports currently service while recognising that competitiveness can be increased with efficiency, underpinned by the location and connectivity.

Conversely, the importance of collaboration becomes evident when evaluating the risk to productivity. Vilko et al. (2019) discussed the risk management abilities in multimodal maritime supply chains and divided the risk into exogenous and endogenous elements. The latter was illustrated with multiple risk events related to stevedoring. These were exemplified as lack of personnel, fault in cargo systems, quality of information, cargo handling equipment conditions, social problems, organisational demarcation lines, and interpersonal relations.

The literature on port competition discusses location and position in the logistic networks, underpinned by the legislation and regulations. At the same time, the operational tactics consider the option from an inside-out perspective. This practice is also observed in generic strategies on competition, such as the five forces model (Porter, 1980), where the options are evaluated based on the mapping of the macro and meso systems. Porter (1996) later discusses these activity systems and argues that strategy is not operational efficiency but a trade-off to assume a competitive direction. This view of the individual position in the system thus assumes that actors have options to decide on altering products, markets, or services.

The business model for port authorities limits strategic options to the activities described in current regulations. This fact drives the discussion towards the opportunities provided by the hinterland, as observed by Haezendock et al. (2018), who use Porter's (1998) diamond matrix to build the port hinterland matrix. This matrix takes an inside-out approach to optimise the current situation. The context of this situation can also be considered by rethinking the five forces model (Porter, 1980) as proposed by Grundy (2006). This rethinking depicted micro-rivalry and dominant factors. These factors included market commitment, the number of players, their strategy and disposition, and their differentiation from each other.

The situation depicts a scenario where port competition is related to practicality, noting that ports cannot change the multiple factors related to the location that determines the position in the network and hinterland connectivity. In contrast, the options of service the port can engage in are highly regulated. There is a difference between Haezendock et al.'s (2018) resource-based view of the options for ports and the more analytical approach of evaluating the port as part of networks, discussed by Garcia-Alonso et al. (2019), Santos and Soares (2017) and Xu et al. (2018). The inconsistency is if port competitiveness is analysed in context to the position related to customers or the situation in the network. Therefore, the actions differentiate concerning the port authorities' view on strategic options, while shippers remain the decision-maker on which port they will use.

These options raise the question of whether shippers make homogeneous decisions, or these vary with different cargos. Exemplified by the research of Balci et al. (2018), demonstrating that the distance to the port was an overarching decision with bulk cargoes. The findings from Balci et al. (2018) coincide with Haezendock et al.'s (2018) port hinterland matrix on competitiveness. This resource-based view considers the options based on the port as a connection point but ignores the other factors found by Balci et al. (2018). These factors relate to handling speed, efficiency, cost, responsiveness, and facilities. A logical approach to ports exists when it is advocated that the options decisive to the operational efficiency directly correlate to competitiveness. These options coincide with the five factors of operation management; quality, responsiveness, reliability, dependability, and cost. Such factors portray ad hoc research for the specific port in the concurrent situation with the single purpose of benchmarking to ports in the network. The study of these networks would allow ports to understand the various networks' options.

Garcia-Alonso et al. (2019) described port competition in the network as being in context to the spatial network of the hinterland. Garcia-Alonso et al. (2019) state that rail transport is not necessary to grow the cargo volumes but point towards factors determined by the distances. Garcia-Alonso et al.'s (2019) research is related to Spain's hinterland connectivity. Therefore, it is relevant to compare with the research of Santos and Soares (2017) on multi-port gateway design, which interlinks Portuguese ports to Spain and thereby broadens the network. The question is how the various researchers consider these intertwined networks and which factors may be managed by the ports. Santos and Soares (2017) point towards the natural hinterland and the corridors to bring the goods to the port and recognise the role of

the terminal operators and ocean carriers. This consensus realised that decision-makers could be both shippers and carriers, where one represents the connectivity to the hinterland and the other, the routes network, including other ports. Consequently, it remains relevant to consider how competition occurs in these networks.

The review of the literature on competitiveness in ports reveals the parameters necessary for competitiveness and studies the issues of implementing new models in the 'Motorways of the Sea'. In context to the factors affecting competitiveness, the literature review is used to identify the companies involved in the port operations and determine which can affect the competitive factors. Consequently, it can be noted that all the companies obviously can interact to improve transactions and thereby increase activity but have no influence on the connections to the ports and thereby the competitive position in the port logistic networks. In principle, it must be confirmed that the port is favourable placed in these networks and then evaluate how collaboration can promote competitiveness.

Factors/Companies that can influence the situation	Port Authority	Stevedores	Dockers	Shippers	No influence
Productivity (turn-around time, berth availability, congestion, etc.)	X	X	X	X	
Position of the Port, located in the network of ports					X
Price of the Port and the services	X	X	X		
Interaction with companies within the port to improve transactions	X	X	X	X	
Hinterland corrections and supply chain integrations					X

Table 3 – Influential companies

2.4 Competition in port logistic networks

The location of the port and the hinterland connectivity, in combination with the prices, play an influential role. While the hinterland activities are the guiding factors for activity, competitiveness must also be considered in context to path dependencies, as suggested by Biermann and Wedemeier (2016). They compared the Port of Hamburg with competitive ports in the area and concluded that the hinterland connections were instrumental in the competitiveness. This learning could propose that ports only compete on the identified factors: productivity, network position, price, the interaction between actors, and hinterland connectivity. Xu et al.'s (2018) research contest this, as this shows that decisions in networks vary with other considerations. Xu et al. (2018) modelled decisions in the port-hinterland regional networks in China. They noted that environmental concerns might influence the findings in the networks and hence the shipment route.

The subject was discussed by Wei and Sheng (2017) for dry port networks in China. Dry ports are inland ports that collect and pack the goods to ship this to the ports at the lowest cost. Wei and Sheng (2017) found that the concession between the port and dry port, together with environmental considerations, was instrumental in shifting cargo towards specific ports. This consideration demonstrated the options of the port to affect the competitiveness beyond the cargo tariffs and ship dues. The research of Xu et al. (2018) and Wei and Sheng (2017) show that network behaviour

may be based on collaboration and awareness of mutual interests, such as environmental considerations, and limited by the choice of carriers to call the port.

There is consensus on the importance of hinterland connections and the port's competitiveness. The question is if this may justify the rationality for shippers to select the port and if there are situations where these decision-makers will opt for alternatives based on other factors. Xu et al. (2018) and Wei and Sheng (2017) implicitly suggest that decision is based on behaviours, while research by Garcia-Alonso et al. (2019) and Santos and Soares (2017) use analysis and quantitative data to explain the competitiveness. Even though this portrays various methodologies in the approach to research the port competition, it does not consider the intertwined landscape of shippers, carriers, port service companies, and port authority and their adjoined influence on competitiveness.

Rethinking Haezendock et al. (2018), Porter (1989, 1998) and Grundy (2006) another perspective of the Port Hinterland Matrix could be found. The view of the port authority and shipper would vary with their desire to generate profit, creating diverging perspectives. Hence, the Port Hinterland Matrix (Haezendock et al., 2018) suggest that the port may obtain higher prices for goods that are difficult to move to other ports, such as bulk material. This behaviour may deter the shipper from selecting the port for different types of goods that may easily be shifted to competitive ports. Such a behaviour-based example is discussed by Kang and Kim (2017) for port sustainability. They clustered the various economic, social and environmental factors and noted that port competitiveness increased with more sustainability efforts.

In context to how this may influence ports, the arguments of Grundy (2006) to think of factors outside the industry appears valid. The port hinterland Matrix (Haezendock et al., 2018) would have needed to consider all the aspects of the Diamond Model. The model's chance may be the port's position concerning the hinterland activities, while competing ports represent the related and supporting industries in the model. The demand conditions are related to prices, efficiencies and other factors affecting shippers' decisions, while the factor conditions are under the influence of the port. The governmental aspect is exemplified by the regulations for the port sector in various countries. Therefore, adapting the Diamond Model (Porter, 1998) to ports displays the limitations of port strategies to encompass collaborative efforts in the microenvironment.

The context of the diamond model to ports can be exemplified by the proposed green transition in ports, which entails a reduction of carbon emissions from the ships. Ports with green power available have a factor condition to provide shore power to the ships, thereby reducing carbon emissions. The demand for greener ports is seen from the encroaching cities and shippers. Still, to capture this demand, ports must work with shipowners to match the available shore power to the specific ship, requiring agreements between these two parties. To make this happen, the governing institutions commence developing rules to nudge the change to take place. For example, the Alternative Fuel

Infrastructure Regulations suggest that shore power must be available for all ships from 2035. Until the date for implementation, ports may attract environmental-aware shippers if they can reduce their carbon footprint. At the same time, shipowners may wait for change of improved technology. Ports can seek to influence the governmental factor through political influence to change regulation, or they can collaborate with the ship owners to create a situation beneficial to multiple stakeholders. This could be done if shore power provides a cost reduction for the shipowner and is deemed a competitive advantage.

The port may reduce cargo tariffs and shipping dues to compete with other ports. Still, if the port's other services portray anti-competitive behaviour and do not acknowledge their impact on the overall port ecosystem, the shipper may opt for alternative networks. Port supply chains can be described as infrastructure and port service companies, comprising stevedores, dockers, tugs, pilots, cranes and handling equipment. The supply chain must be competitive when these elements are combined, even if the port has no direct influence on all of these services. Hassel et al. (2013) recognised this when amalgamating port and supply chain with the hinterland connection in evaluating the implication of the sulphur-emission-controls implemented in 2020. Hassel et al. (2013) implicitly concluded that this change in legislation could affect supply chains and, therefore, port competitions, wherefore the research portrays another view from the perspective of the Diamond Model (Porter, 1998), which is the government perspective.

Much research on port competition is concentrated on hinterland connectivity, throughput capacities, and outside changes affecting the situation. In contrast, the research on the options ports has to increase their competitiveness is scarce. Kenyon (1970) noticed that the port location and their offering to the customers were key traits of inter-port competition in the USA. This situation embodied much of the research into ports from the outside perspective, while the port's strategic options revolve around the ability to create attractive conditional factors. Such factors require collaborative efforts with the actors conducting the ships' loading and discharging. In many ports, these are private enterprises, and the port authorities must therefore be able to collaborate with these competencies. This portrays a situation where ports may be considered part of a network. The conditional factors must be influenced to increase competitiveness, pivoting the options available towards influence and collaboration in networks.

2.5 Network Collaborations

The attractiveness of ports is inevitably linked to logistics, which in this context must be for cargoes to be transported from origin to destination at the lowest possible cost without causing damage to the goods or harm to the environment. The price is imperative to gain attractiveness, wherefore this also must be central in the network collaboration. Huang et al. (2016) suggested that operative collaboration was used to optimise price in the supply chain and compared this to the bargaining power of the various companies and stated that 'if the bargaining power is not equal, the relationship will more like a simple form of buyer-supplier. Huang et al. (2016) research evolve around

China's pharmaceutical industry, which differs from ports. Still, the same methodology of compartmentalising collaboration concerning the outer environment, internal competition and operational phases may be plausible.

This phase provides the causal relation between the port in the supply chain network and the ability to create an attractive internal collaboration to improve port operations. As exemplified by Kenyon's (1970) research, inter-port competition would result in the port service collaborating to achieve leadership in cost and efficiency. It may be described as the operational phase related to the conditional factors in the port. Therefore, the case for collaboration must provide cost-benefit to the individual companies and price reduction to the shipper, as this theoretically would increase the overall competitiveness of the port. This competitiveness is performed by increasing efficiency and changing the hinterland connectivity with involvement in the supply chain. However, the question remains on how the companies in the ports acknowledge the external situation and if collaboration can be mustered to strengthen competitiveness.

Chandra and Hillesgerberg (2017) distinguished between essential and potential roles in port collaboration in the Port of Rotterdam. In context to the earlier detailed port supply chain, it may be noted that tugs need to collaborate with pilots and carriers. In conformity, shippers need to collaborate with stevedores, which need to hire cranes, handling equipment and dockers for the supply chain to function. These are essential roles in port collaboration, intertwined with the four different governance models for collaborations in the port, detailed by Chandra and Hillesgerberg (2017). These were advocated as market-driven, shared governance, lead organisation and network administrative organisation models of collaboration. In contrast, Change and Hillesgerberg (2017) detailed how the Port of Rotterdam had preserved its network administrative organisation, and the enabler was the development of various software systems.

It questions if there are various models of collaboration depending on the situation within the ports and how this is orchestrated in praxis. The models may depend on the intertwined nature of the companies in the port. The actions of the port authority may thus be pivotal in selecting a model for collaboration. In the case of the Port of Rotterdam, collaboration was exemplified through the network organisation administrative model. Conversely, the situation within the network of the port dictates the readiness for collaboration, which may determine how a framework can be developed. From the port authority perspective, the model's achievement determines if collaboration increases competition in the network.

The reverse situation was noted by Stavroulakis and Papadimitriou (2016) while discussing the strategic factors shaping the competitiveness in maritime clusters. Here they said that antagonism might be catastrophic in the process. It appears self-explanatory that for groups to function with interaction, the members must cooperate. Still, contrary to networks, Stavroulakis and Papadimitriou (2016) noted that conceptual and physical factors determine clusters.

Similar, in ports, the role and powers of the actors are based on their capabilities, competencies and position in the network. To evaluate this, the place and abilities of the companies in the network is crucial.

Borondo et al. (2014) discussed this phenomenon of attractiveness in networks, who describe the networks as topocratic or meritocratic depending on the intermediaries that a sale must go through from seller to purchaser. In the context of ports and their position in networks, this research is relevant considering the cost of using the port. Therefore, when considering the work of Borondo et al. (2014) for ports, the research of Xu et al. (2018) can be considered. Xu et al. (2018) evaluated the network in the hinterland for the two competitive ports of Dalian and Yingkou about the environmental footprint of intermodal transport for the chosen transport route in the network. Xu et al. (2018) proved that environmental concerns were the pivotal point of the shipper's decision, and the flow of goods could be predicted. The competition could then be predetermined, and Xu et al. (2018) argued that competitive ports might only influence the network by developing attractive dry ports, thereby disrupting the network. The implicit conclusion of Xu et al. (2018) coincides with Borondo et al. (2014) research on topocratic networks, stating that the power available to the individual is primarily obtained by the position in the network.

The work of Xu et al. (2018) has the limitation of evaluating the flow from the manufacturer to the port, where the shipper is the decision-maker but the network is epitomised by the transport from manufacturer to end-user. This places the ports in very complex networks, given that various cargoes are shipped to many locations. Therefore, the practicality is to demonstrate the competitiveness of ports by including the hinterland shipments and transhipment cargoes through the logistic chain perspective. This was researched by Song et al. (2016), who recognised that port charges played a pivotal role in the network and stated that the cost coefficient of ports is a competitive factor. Therefore, the price and efficiency of port services are imperative in this context. Furthermore, from the network perspective, the port service may drive the port's attractiveness, which again influences the size of the hinterland using the port. In contrast, the position relative to other ports describes the possibilities.

Such possibilities may not accurately describe demand, as ports often are supplementary to each other. This is observed with the container traffic, where small ports have feeder services to larger ports. In such cases, the cost and efficiency of a feeder port may also benefit the more significant port. Merkel (2017) describes this as the spatial dependence between ports when researching the ports of Hamburg and Le Havre contra Mediterranean ports and found that ports complement each other in the latter. Merkel (2017) concluded that port competition or complementarity was not uniform, and standardising legislation would have consequences for either of the situations.

From a network perspective, the research of Xu et al. (2018), Song et al. (2016) and Merkel (2017) has the commonality of the attractiveness of the port as the driver of competitiveness. The attractiveness is related to the activities in the hinterland, port efficiency and complementariness to the network. In view of attractiveness in networks, Hausman et

al. (2012) researched the prosperity of each country and developed a complexity index. The trends in Hausman et al. (2012) showed that countries with high complexity index generated more wealth. Hausman et al. (2012) findings are related to knowledge and correlate to the research by Bahar, Hausmann and Hidalgo (2014) found that learning is diffused by distance and the similarities in export from countries affected by the proxy of distance. Bahar, Hausmann and Hidalgo (2014) noted that the export pattern of neighboring countries was similar and concluded that knowledge decay with distance. Evaluating such conclusions with the research of ports, Merkel (2017) found that ports in one region were complementary, implicitly illustrating knowledge sharing or collaborative efforts. The causality between knowledge, complexity and prosperity findings may be interrelated to each port and used for assessment of the inter-port competition. Ports close to busy hinterland activities and capable of servicing multiple markets may generate more activity, provided that port activities remain attractive when considering price and efficiency. It raises the question of whether knowledge sharing and collaboration among actors in the port can increase the attractiveness and, therefore, the port's competitiveness. Improved competitiveness would lead to a view of the port shifting from a node in the network to a cluster, where one can discuss collaboration.

2.6 Competitive advantage of Clusters in Ports

Porter (2000, p.16.) defined a cluster as “a geographical group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities”. Hence, to define clusters within a port, it will be necessary to compartmentalise clusters for each market segment and understand their functions and benefits. These functions provide a different perspective to networks, where interdependence may initiate collaboration, while in clusters, the idea is how commonalities lead to collaboration.

Bhawsar and Chattopadhyay (2015) discussed clusters' territorial and sectorial factors and mentioned that ports are parts hereof. In context to the supply chain in ports and how competitiveness is improved, there will be clusters of competition that need to be shifted to collaboration. The research from the Port of Rotterdam conducted by Change and Hillesgerberg (2017) showed a network administrative cluster including peer companies. In this case, sharing knowledge led to improved port operation, albeit the research did not conclude on the competitive effects.

Bhawsar and Chattopadhyay (2015) proposed various metrics of clusters that allowed for comparison with other clusters. Their analysis provides for relative comparison, where the function of the cluster is the determent for the advantage that can be gained. Taurino (2015) concluded on similar functions, noting that the three complementary aspects were the ‘network cluster, management committee and cluster creation dynamics’. This could be considered the buildup of the cluster, and the practice allowed for companies to decide on their involvement, which implicitly must involve alignment with the purpose of the cluster. Finally, Dewitt et al. (2006) studied clusters in communities. They found that the integrated behaviours of clusters are the sharing of information, corporation, shared goals and risk-sharing in long-term relationships.

Dewitt et al. (2006) thus described the ultimate cluster formed by strong bonds of the participants, but the question remains if the cluster will be competitive in networks. In this context, Porter (2000) took a balanced approach to clusters and microeconomic societies and stated that part of clusters amplifies the Diamond Model. This statement would suggest that clusters in ports, where factors in the Diamond Model are changeable, could increase the competitiveness of the network. However, in some situations, this would require peer companies to cooperate towards a common goal, which also coincides with Porter's (2000) argument that competition and cooperation can coexist, as they are part of winning the competition on other levels.

This portrays the consensus between Porter (2000) and Dewitt et al. (2006) in clusters as communities functioning through their interactions and ability to create positive synergies, which could not have been achieved without collaboration. However, the question remains if the cluster theory is based on an researched phenomenon or if this can be created in ports using the governing mechanism suggested by Bhawsar and Chattopadhyay (2015) and which drivers will make the cluster competitive. Provided that the port shall be understood as a cluster, the productivity must increase competitiveness through the actors. Bos and Wiegmans (2018) identified factors related to throughput, comprising reliability and handling cost, as weaknesses in short sea shipping while recognising the lack of information systems. Tovar and Wall (2019) found that larger ports are more productive in conformity to this. These findings are not surprising. If efficiency is measured as efforts per ton of cargo handled, larger ports have the cargo flows to achieve economies of scale. Conversely, the stevedores managing the cargo operations appear instrumental in driving the competitiveness of smaller and larger ports. This raises the question if collaboration among port service companies and port authorities can create a cluster that enhances competitiveness.

Vangen (2017) discussed the idiosyncratic culture of collaboration, where inherent tensions were alleviated with communication trade-offs and compromises in the pursuit of collaboration. Vangen (2017) thereby moved beyond the collaboration in cluster-based on location, activity or commonalities towards collaboration by overcoming complexity. In this context, it will be required to evaluate the dexterous competition in ports, including the interaction between port service companies and the norms of their operations.

2.7 The conceptualisation of port systems

A port may be viewed as an industrial ecological system with multiple actors performing the conditional factors for loading and discharging ships. From an epistemological view, these operations may be referred to as the obligatory passage point (Walton, 2013), which portrays the disposition to act based on tacit knowledge. The interaction of these actors is required to perform the operations, and they are each jockeying for their position in the cluster, where several companies may perform the same service.

This requires understanding of the port ecosystem. One methodology was described by Hanafizadeh and Aliehyaei (2011) with fuzzy cognitive mapping to develop a chain of concepts that define the problem in an integrated form and represent stakeholders' perceptions. Fuzzy cognitive mapping creates value, as it identifies the stakeholders affecting the situation without considering the issue. Therefore, fuzzy cognitive mapping can be viewed as the continuation of traditional methodologies, such as the CATWOE technique that evaluate the system in context to the situation. The principle is to find the elements that affect the situation and determine factors that may increase collaboration. In essence, fuzzy mapping can determine the power structures between actors. This is relevant when considering the arguments of Vangen (2017) of collaboration by conquering complexity, but it also reveals if coercion exists between the actors. In principle, collaboration may be conceptualised as common goals that lead to collective benefits or situations of compromises where each actor moves towards a decision that they would not have achieved alone.

In relation to the conditional factors, considered as the activities related to port operations, these activities are also a combination of the knowledge and capabilities of the various companies. The offshore wind segment differs from traditional cargo operations. Ports servicing offshore wind are today very different from conventional ports, as offshore wind operations utilise fit-for-purpose designed handling equipment and special trained stevedores and dockers. The fast-paced developments of offshore wind turbine sizes require constant investments for ports and companies supporting the offshore wind industry. For ports servicing these offshore wind markets, the denominator is large areas for storing components before the installation projects, heavy-duty quay facilities to conduct the pre-assembly activities and seabed preparation for turbine installation vessels to perform the load-out operations.

In May 2021, the WindEurope Intelligence Platform launched the report, A 2030 Vision for European Offshore Wind Ports; Trends and Opportunities. The report forecasted that Eur 6.5 billion investment is needed in the European ports to cater to the offshore wind market and called for the European Commission to develop a 'port strategy and recognise ports' societal and ecological value. The infrastructure needs in the form of more port capacity are thus identified, but the capabilities will not increase without considering the conditional factors. Stevedores need to invest in equipment to handle the offshore wind turbine components, while dockers must continuously improve their skillsets. Further, the supply chains must be cost-conscious and efficient and close to the wind farms. Cost and efficiency become proportional to activity when noting Poulsen and Hasager's (2016) research that concluded that logistic costs for offshore wind farms could account for 18% of the Levelized cost of energy. Therefore, it will be necessary to review competitive factors separately and evaluate this to the situation for offshore wind and understand where collaboration would create benefits for both the port and the companies conducting the activities.

This necessary change in offshore wind ports may benefit from sharing knowledge to augment the continued building of capabilities. The idea of a framework for joint decision and collaboration would require interaction in the supply chain, which could improve the port's competitiveness. However, practicality suggests that not all functions need to

develop collaboration, as their position in the supply chain formalises interaction. As exemplified, when bigger wind turbines are designed, larger cranes must be available in the port, and the stevedores and dockers must be trained to handle the components. It exemplifies how the decision in the transport chain must be aligned for offshore wind ports to cater for the ever-changing demands. Conversely, such an assumption depends on either a contractual relationship between the parties providing clarity on the future direction or a common belief in the port's competitiveness and the markets for offshore wind.

Song et al. (2016) model port competitions from a transport chain perspective and consider containerised cargo loading, transport, and discharging. A similar process may be evaluated for offshore wind. The sequence for offshore wind is the fabrication of the major component, transportation to the port, pre-assembly, load-out and installation. The question is how much impact the intra-port competition serving the offshore wind markets has on the transport chain cost. If this will dictate the possible effects, collaboration among companies may contribute to the overall port competitiveness.

The contextual research by Poulsen and Lema (2017) displayed the supply chain for offshore wind when discussing the development readiness of the supply chain for offshore wind, and the companies working within offshore wind were identified by analysing the supply chain. Subsequent, the data set obtained from 4COffshore (12/2021) revealed that 1305 companies had been involved in all of the installed and commissioned offshore wind farms in Europe, and 7% of these companies were Danish.

The Danish companies are therefore limited in context to the overall supply chain. Still, it may be argued that it is the location of the port in relation to the future offshore wind farms, together with the capabilities of the companies in the port, that may attract the activities. The data from the previously installed wind farms in Europe depict 24 ports that have been involved in offshore wind activities. Port Esbjerg has been involved in 55 of the 112 offshore wind farms in Europe. Compared to the limited number of Danish companies, this relatively large market share may be due to a combination of the position, infrastructure, and supply chain availability. These elements implicit combine the arguments on port competition as infrastructure and interaction (Panjako, Jovic, Tijan and Jogoviv, 2020) with communities functioning through interactions (Porter, 2000; Dewitt et al., 2006).

The supply chain in Denmark was also identified through their memberships of the organisations Energy Innovation Cluster and Wind Denmark, which state that 296 Danish companies are involved in the offshore wind industry, and 59 of these are within the spatial cluster of Port Esbjerg. Therefore, this cluster is considerable from the Danish perspective but does not solely justify the port's involvement in 49% of the offshore wind farms installed; therefore, further analysis of the companies was performed to understand how they supported the supply chain. In this context, the sub-categories of competency, service, and suppliers revealed that 37% of the companies in the cluster were

performing services to the offshore wind installation. This suggests that these companies depend on the offshore wind activities in the port, where the remaining is supplying the production of offshore wind turbines, which is also dependent on the adequate port infrastructure and the possibility to load and discharge the major components.

Port Esbjerg can therefore also be argued to be a node in the network from the manufacturing site to installation. Thus, activities were compartmentalised as inboard logistics, pre-assembly operations, load-out, transport to site and installation depicted in table 4. This compartmentalisation allows evaluating the companies that contributed to the activities that drive port efficiency.

Industry	Activity	Port Infrastructure/ Suprastructure requirements	Companies
Offshore Renewable	Inboard logistics	Heavy lift quay, ramps and roads, transport, mobile harbour cranes and handling equipment	Original Equipment Manufacturers (OEM), designers, shippers, stevedores
	Pre-assembly operations	Crawler cranes, reach stackers, trucks and forklifts	Technicians
	Load-out	Basins and facilities, crawler cranes, sea fastening	Port of Esbjerg, stevedores, dockers
	Transport to site	-	Turbine installation vessels
	Installation	-	Turbine installation vessels, technicians

Table 4 – Compartmentalizing

Further, I noted that the logistics and workforce are intrinsic to the port's capacity, while knowledge is instrumental to its competitiveness. Therefore, I prepared an analysis of the logistic cost of installing a wind farm offshore Nederland to demonstrate this argument. The calculations showed that the installation cost using Port Esbjerg outweighed the use of Port of Rotterdam for pre-assembly and installation. Still, given that the major components are produced in the hinterland of Port Esbjerg and Cuxhaven Port in Germany, it is noted that the transport cost to the Port in Holland exceeds the additional cost of the longer sailing distance between Port Esbjerg and the offshore wind farm in Holland.

Thus, spatial consideration and the relationship between manufacturing and ports influence the pre-assembly and installation activities. This display the competitiveness concerning hinterland connections agreed by Song et al. (2016), van der Bos and Wiegman (2018), Haralambides (2015) and others if it assumed that the competitiveness is proportional to the distance between the manufacturing site and the wind farm, and Port Esbjerg's attractiveness is determined by its location. These findings also coincide with Merkel's (2017) argument that port competitiveness is nested in wider networks with spatial dependence. This is relevant to offshore wind ports, where shipment of offshore wind turbine generators requires efficient port operations. The situation also depicts the argument from Zaoual and Lecocq (2018, p. 137.) in their discussion on industrial ecosystems, where they state that "networks are inter-organisational structures consisting of independent organisations involved in long-term relationships to achieve collective goals".

Conversely, the analysis also shows that attractiveness is related to efficiency. The logistic project cost is lower in Port Esbjerg if loading operations can be conducted in 24 hours compared to 72 hours. This provides empirical evidence of how productivity from stevedores and docker drives competitiveness in the offshore wind supply chain.

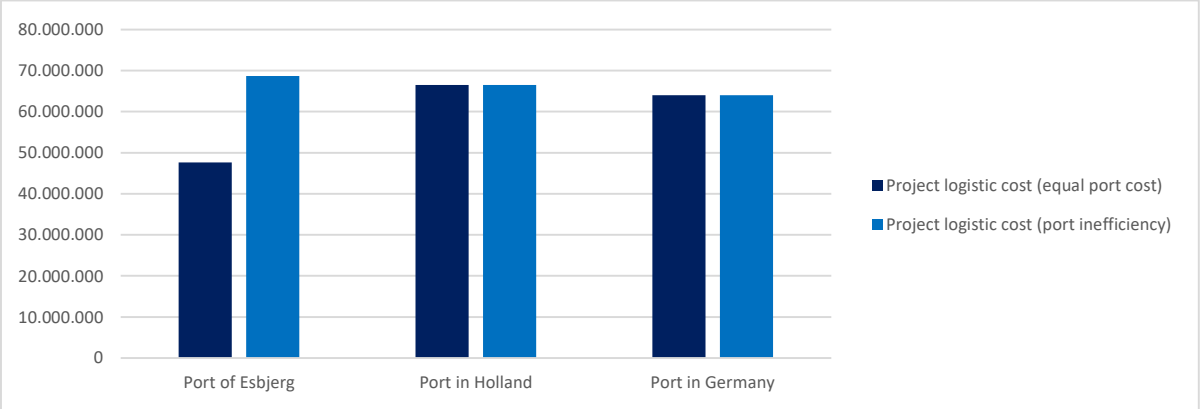

Figure 1 – Installation Cost

Shafiee et al. (2016) recognise that ports are part of the parametric whole-life cost model for offshore wind farms, even though this cost only contributes to 1% of the overall CAPEX structure of the wind farm. This indicates that the port cost does not influence the appraisal for an offshore wind farm and, therefore, will compete on their activities concerning the logistic chain in the construction of offshore wind farms. Thus, the elements which can be influenced by the port authorities are limited unless collaboration with companies to increase capabilities and efficiency is pursued.

The promulgation for collaboration in the supply chain for offshore wind farms is agreed upon by Irawan et al. (2018). They advocate that 'complex logistics and large size of the offshore wind components, modelling the component flow most efficiently is necessary for minimising the supply chain cost' and propose a multi-criteria decision-making method. Irawan et al. (2018) method weighted the attributes of ports based on the position and infrastructure comprising quayside facilities, seabed conditions, bearing capacities and hinterland connections to manufacturing sites but ignored port operations.

Consequently, the approach to evaluating the supply chain cost of offshore wind farms needs to consider the Port location concerning the manufacturing site and the distance to the offshore wind farms to be installed. Furthermore, the supply chain optimisation should also include labour efficiency and equipment lease. This concurs with Kang and Moon's (2016) argument that supply chain integration and collaboration can influence supply chain performance by considering a resource-based view and dynamic capability theory.

The capability of the stevedores and port must be evaluated together. I found that the theoretical framework could be built on enabling factors, such as alignments of worldviews and agreement to learn and collaborate in pursuing performance. In the Port of Rotterdam, Chandra and van Hillegersberg (2017) conducted a case study based on the implementation of bespoke software, which allowed for transparency between the actors in the port and concluded that 'having the roles defined, all parties can decide on the suitable governance model for the collaboration'. The software is a community platform where current supply chain players share information and collaborate. This learning

was meaningful in understanding that software can be the structure for collaboration. Still, there must be engagement from the participants throughout the process, and inter-dependency must therefore exist between the participants.

In the context of operations in Port Esbjerg, there is a need for both port authority and the companies to continuously evolve and develop their capabilities per the changes in the offshore wind industry. Investments in port expansion need to be coupled with acquiring more equipment, in addition to training personnel. The findings from Chandra and van Hillegersberg (2017) showed that collaboration can be developed with knowledge sharing but did not conclude on consistent strategic decisions. This is needed in Port Esbjerg and drives the quest for a new form of collaboration.

Contrary, such pursuit of collaboration should not lead to collusion and cost escalation nor increase the risk to the individual companies. Vilko, Ritala and Hallikas (2019) discussed the risk in port supply chains, where they considered the controllability and visibility of risks while separating the risk sources and concentration into exogenous and endogenous elements. In context to the companies in ports, the controllable risk may be the competencies, planning, management and investments in equipment, while strike, a weather delay in the pre-assembly or load-out frequencies are outside the control of the port authorities or companies. This portrays the notion for risk minimisation and operational efficiencies to be considered in the framework for collaboration and displays why the port system for managing the complex situation becomes imperative.

2.8 Dynamics in Collaborations and Decision Making

In this context, ports may be viewed as ecosystems, where companies are interlinked actors through their operations in the port. They operate independently but adapt to the conditions in the port. This port ecosystem may be considered self-regulating and similar to competing ports, as observed when comparing Port Esbjerg with a competitive sport in Germany. The overall cost for a port call, illustrated in figure 2, comprising pilotage, tugs, dockers and cargo fee, varies significantly between the two ports, but the overall cost is comparable.

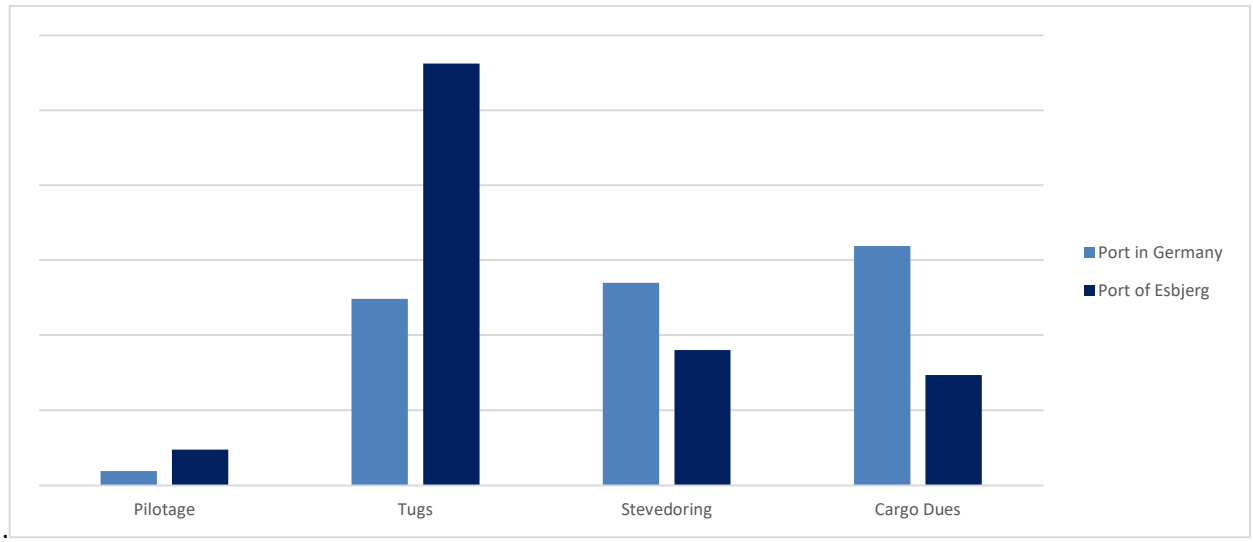

Figure 2 – Overall Port Cost

Therefore, the importance of the port and service cost remains valid when considering competitiveness, and empirical evidence of self-regulating behaviours is demonstrated when the cargo tariffs and cost of dockers inadvertently have been reduced to compensate for the higher cost of tugs and pilotage in Port Esbjerg. Furthermore, it demonstrates interdependencies between these companies, even when they act independently. Conclusively, competitiveness is a pattern of all the companies involved in a port call. The port cost in figure 1 portrays how some companies based their decision on their individual opportunities without regard to the competitiveness of the port ecosystem.

The supply pattern may also explain this situation, where five stevedoring companies in Port Esbjerg compete fiercely. At the same time, there is a monopoly for towage and pilotage. Thus, the buying power of the stevedores is higher, and arguably, they may benefit if they can benefit from collaboration with other companies in the supply chain. However, to create collaboration between these companies, they must concur with market possibilities and invest in factors affecting their capability and competence, which requires collaboration in new ways.

The self-regulating behaviour of the port ecosystem allows for the port to be considered a complex adaptive system but to understand the interactions between companies based on enactment, the actor-network theory can be considered. Kim and Kaplan (2011, p.8) argue that complex adaptive systems “CAS describes how actors interpret the selection mechanisms within their environment and modify their strategies to pursue what they regard as being within their interest”. In contrast, actor-network theory may explain the difference between actuality and observance. The case of the companies within the Port of Rotterdam that shared knowledge with the implementation of software systems (Change and Hillesgerberg, 2017) exemplify the heterogeneous network within ports. Therefore, it must be considered how companies self-organise to influence such networks.

My view of ports as complex systems intertwines with the opinion of the external environment using the diamond model. However, the difference is the linkage between the various factors affecting the overall situation. The diamond model assumes that the elements affect each other, and the concurrent situation can be explained through information and decisions between the actors. Conversely, in the complex system, there may be no evidence of communication between the actors, but each has evaluated the external environment to make their own weighted decision. Conversely, if harmony exists in the possibilities in the external environment, each actor would logically pursue the options best for their current situation. This unanimity may form the collaboration to pursue new opportunities that will provide a competitive advantage to the Port.

This provides a dilemma, as actors benefitting from their position in the system may be less inclined to participate in collaborative efforts than those who may obtain a better position. This behaviors of also relates to risk. An actor in an advantageous position may view collaboration as a risk to that position, whereas the actor in a lesser favourable

position may see collaboration as an opportunity. The implication for port authorities seeking to create collaboration will be to understand how the various actors intertwine and what the decision-makers are and who may influence them. On the contrary, there may also be situations where collaboration has to be achieved without consensus or participation of all the actors, which may affect the planned outcome. This reflection concurs with Vangen's (2017) arguments for discarding conventional change management and seeking collaboration through communication and shared views.

This is also important for the situation intended by collaboration in Port Esbjerg, where the decision must coincide with enhancing the competitiveness. This requires investment in capabilities and therefore represent a change to how the companies and port authority collaborate today. To model this activity, Checkland (2000, p. S27) argue that one needs a "To build a model of a concept of a complex purposeful activity for use in a study using SSM, you require a clear definition of the purposeful activity to be modelled". Port authority and stevedores, dockers and shippers all become influential in the behaviour of all those involved. Exemplified, the dockers create sanctions by blocking ships, causing uncertainty among shippers. The result is that the shippers opt for other ports. Thus, the relationship between docker and stevedores becomes affected, as the actions affect the latter's activities. This illustrates how messy and personal the balance is in the complex system, and this is both contemporary and evolves unpredictably.

The situation can also be viewed with the cynefin network. Franke (2011, p.13) discusses decision-making and argues that such "do not always lend themselves to patterned behaviour, predetermined choices, or predictable outcomes". Consequently, there must be coalition building and sense-making to navigate complex systems and one must appreciate that the system is not static or given. Sufficient consensus needs to be created for a new form of self-organisation to occur. The relationship between the initiator, which in this research is the Port Authority, and the actors must therefore be built on trust and the belief that mutual benefits can be obtained.

The interaction between the actors must be observed to identify how the framework for collaboration may be developed. Gray and Wood (1991) argued that shared rules, norms and structures may be implicit in collaboration when participants already share a negotiated order. It is suggested that such purposefulness can be obtained by the common cause for efficiency, sharing resources, and forming alliances and uniform rules. This may be juxtaposed with actors' self-interests, as exemplified by dockers' blockage of vessels. In context to offshore wind and the earlier discussed supply chain, the collaboration between actors conducting the pre-assembly, the decision of one party would affect the other party, wherefore the relationships are governed by the rules outlined in the contracts both hold with the shipper. In this context, hyper-collaboration is meant as a collective effort to develop new ways of working together that would not have emerged without collaboration in the sphere of the individual participants.

Kolk et al. (2018) argued that 'Hyper-collaboration is based on the fundamental belief that innovation ecosystems, not individual companies, will deliver novel solutions that open new markets. This requires multiple levels of interaction, and change may be viewed following Vangen's (2017, p. 313) work stating "as with perceptions of national cultures, perceptions of professional cultures identified in this current study tend to focus on attributes that are typically manifested in individuals' behaviours rather than the profession as a whole". To begin the culture towards sharing knowledge and later collaboration, Chandra and Hillesgerberg (2017) found that the information-sharing platform enhanced interaction in the Port of Rotterdam. A similar phenomenon can be observed in Port Esbjerg, where the ONEPort system is used by more than 80% of the customers is sharing information.

The system described by Chandra and Hillesgerberg (2017) or the described solution from Port Esbjerg has not provided empirical evidence of hyper-collaboration but merely enhancing information flows. Nevertheless, Chandra and Hillesgerberg (2017, p. 656) concluded that "Rotterdam's port community gives an example of how a systematic approach could help to communicate and give a comprehensive overview of the governance of inter-organisational collaboration".

Collaboration may be viewed as a change of service to move beyond sharing information. In this context, peer-to-peer trading was discussed by Avital et al. (2014), and they found that it was not the design of the software system but the impact of the service that mattered in the implementation phase. To evaluate the purpose of the system to enhance the collaboration between companies in ports, the overarching purpose of competitiveness is essential, and hereunder efficiency and cost. The sharing of information, knowledge and eventually, resources needs to create the purposefulness described by Checkland (2000). To share between companies, Siuskaite et al. (2019) argued that factors and drivers encompass social, economic, ecological and technological forces contributing to a sharing economy.

The sharing economy may be exemplified by several companies sharing the same resources. Ports are an example of a sharing economy, where quays, cargo handling systems, cranes and warehouses are shared among several companies. In this context, companies' capability is entangled with the port's resources. The dilemma exists when resources are required, which the port cannot provide due to regulatory issues, financial constraints, or operating limitations. Practicality in operating practice thus becomes a constraint, and regulations limit the sharing economy model. The example also references the port ecosystem model, as this identifies governmental factors in the meta-system, which can be used to explain the constraints in possible actions.

The European Union regulates ports in Europe, and there is a limitation to the services ports provide and how such activities are performed transparently. The imagined situation could be one port subsidising their cranes, which would attract cargo from nearby ports not taking such an approach. This would adversely affect the activities in the port's

hinterland and be deemed non-competitive. To prevent such anti-competitive behaviour ports are highly regulated, and various practices have been adopted. For example, private enterprises have traditionally delivered stevedoring and supplied handling equipment. This practice encapsulated Vangen's (2017) argument for change through conceptualising the complexities, contradictions, and trade-offs, considering the social factors, Chandra and Hillesgerberg's (2017) consideration of the technological forces, and Avital et al. (2014) arguments of the impacts remain valid for the economic or ecological factors. However, this reverts the focus towards the sense-making efforts to the change in complex systems, where risk and resistance can be identified.

Such sense-making portrays the need to discuss the intrinsic of hyper-collaboration and consider how the perceived situation affects individual decision-making. Brown et al. (2016) stated that there is robust relation between the tendency to procrastination and the likelihood of default, and their findings were constant across various demographics. This procrastination illustrates the reluctance to make decisions if the result may be detrimental to the situation. This resistance to change and the underlying tendency may also be cultural and dependent on the situation. Consequently, the possibility to engage in new thinking and develop innovative approaches comes with deploying the resources to participate. In praxis, time and resources are scarce within companies, but it can not be developed without their involvement, and call for the port authority to ignite the process.

This process provides port authorities with a paradox. It becomes imperative to understand knowledge generation and decision-making in the context of the business models within each actor without affecting the relationship between companies operation in the port and the port authorities. The situation would occur if knowledge of one problem with a company changed the behaviour towards another company. The envisaged framework would entail a vision, and efficiency-driven hybrid model, which Siuskaite et al. (2019) implicitly argue is the model for commercialising peer-to-peer sharing models. The platform for actors to engage in sharing activities may be developed with the possibility of external users accessing the capacity of the whole port ecosystem. The critical reflective views of the port and factors enhance the competitiveness may be evaluated from the perspective of the port ecosystem to understand if the hyper-collaboration framework would improve competitiveness in the offshore wind network.

2.9 The concept of hyper-collaboration

Kolk et al. (2018) argue for an enlightened ecosystem to structure through governance systems. First, Kolk et al. (2018) discuss the phenomena of hyper-collaboration, which can be considered an agreement for partnerships to achieve individual benefits through new ways of working together. In conventional business analysis, such as the five forces (Porter, 1980), the operating environment evaluates according to the maneuverability of the individual company and their perception of the situation. Such views habitually result in strategies ranging from merger and acquisition to achieving buying or negotiation power to raise prices or sales volumes in pursuing diversification or cost leadership.

Within the context of ports, this tactic may be disputed with the statement from Cheon et al. (2018) that port competition is a multifaceted concept, which in line with their conclusion, doubts the positive or negative impact of inter-port competition resulting from contextual factors bespoke to the situation. Cheon et al. (2018) implicitly argue that the port's location with the activities in the hinterland is the driver for activities. Therefore, competitiveness is less influenced by how well the companies collaborate to achieve efficiencies. In this context, Cheon et al. (2018) are stating the obvious when considering that ports are nodes in a logistic network, and their attractiveness depends on the location. The most attractive shipment of goods between two locations as the direct route at the lowest possible cost. Still, Cheon et al. (2018) statement is also haphazardly as it considers the present situation, while collaboration must result in a future improved situation.

One can draw attention to the green transition and the focus on lowering carbon emissions. In principle, this situation provides another layer to the decision point of shippers. They may have to use ports that allow them to achieve their emission goals, even if these ports do not have the best location in the logistic network. Hypothetically, optimum is performed when margins become eroded due to competition in ports and operation cannot be completed faster. This phenomenon should then result in increased activities in ports. For the offshore wind ports, the activities depend on the location of the wind farms. Still, the earlier comparison on efficiency when installing a wind farm in Holland from Port Esbjerg illustrates that efficiency and collaboration can influence competitiveness.

To achieve and maintain Port Esbjerg's competitive position, I found that there must be a system constantly evolving to benefit each actor. In this situation, peer companies could opt for mergers or collaboration to achieve bargaining power toward their customers. Still, the result would be that the overall port competitiveness would decrease with the increased cost of these services. I depicted this situation in the cost comparison between port calls in Port Esbjerg and a German Port. Here, companies operating in a monopoly benefitted. In contrast, the others had to compensate by lowering prices to make the port competitive. This call for collaboration differs from exchanging information or knowledge to benefit the individual and build the partnerships for new markets advocated by Kolk et al. (2018).

Exchange of knowledge drives the need for actors to hyper-collaborate, which could be sharing handling equipment, facilities, and supervisors to optimise efficiency within the increasing competition. Kolk et al. (2018) argue that hyper-collaboration requires a shared vision, strategy, navigation, engagement, and fulfilment. Likewise, to engage the companies operating in the port a similar worldview of the situation and the possibilities must exist. This view is affected by the individual situation and their perspective on the future possibilities, which was also implicitly noted by Brandt et al. (2017), when arguing worldviews affect emotional reactions, psychological well-being, and negative evaluations of others.

Hyper-collaboration provides the example of companies building and sharing resources and optimising utilisation envisaged to improve cost performance and enhance overall competitiveness by lowering prices. Conjectured, when peer companies share capabilities in rapidly growing markets, the possibility for co-evolution will exist and collectively become more competitive. Before conceptualising norms, thrust and bias for hyper-collaboration, the must be verified within the port network and ecosystem. In context to the envisaged hyper-collaboration, the system must facilitate collaboration between participants in this research. The different views on participation in this network must be evaluated for their possibility to change. Ferreira and Davis (2012) noted that networks are promoted in change efforts, but the success depends on how well prepared the individuals are and if there is a default to past experiences. Commensurate port operations comprise a high cost of the logistic supply chain for offshore wind farms, and hyper-collaboration may decrease cost and increase margins for the involved companies.

Vangen (2017, p. 316) argued that “inevitably, individuals are likely to enter new situations with embedded ‘ways of being’ which may not feasibly be readdressed with every new or significantly changed collaborative situation”. This argument may not feasibly readdress every new or significantly changed collaborative situation and therefore implicitly agrees that resistance to change deters interaction and becomes the obstruction to collaboration. This situation found the revolutionary change in the competitive benefits of supply chain collaboration that drive the necessity of companies to engage in collaborative communities. The framework for companies to hyper-collaborate must benefits the individual without jeopardising the competitive advantage of all. Conversely, companies operating in the low-margin segments are anticipated to display risk awareness, leading to resistance to change.

Managing the anxiety situation around new ways of collaboration, the work of Gudykunst and Nishida (2001) is relevant when arguing that there is a minimum and maximum threshold in anxiety. The framework for hyper-collaboration must be clear and sellable, and trust must exist between the companies. Still, there must also be portions of familiarity to gain acceptance or avoid exceeding the threshold. Ford and Ford (1994) argue that it is in this space of resistance that new ideas are learned. This moves beyond the shared vision advocated by Kolk et al. (2019), stated for the companies in hyper-collaboration. Before this, there must be an exchange of information and agreements aligning the ideas.

Cohen and Bradford (1989) argued that in a relationship between peers, there must be a reciprocal exchange, meaning that to influence, there must be a particular trade of information. To encourage actors to take part in the development and implementation of frameworks for hyper-collaboration, the task, position, relationship andpersonal currencies, suggested by Cohen and Bradford (1989) needs to be considered in the context of fuzzy cognitive mapping. This consideration will allow for the dialogue toward a shared vision to proceed and 'explore the domain of collective thought' as argued by Isaacs (1993). Isaacs (1993) also advocate slowing down the inquiry and befriending polarisation.

This progress from dialogue to consensus building is required to initiate engagement, but the question remains of how to seek action.

Hyper-collaboration dictates that peer companies must engage and develop this framework, which collectively benefits the individual and the system. The framework would require social norms to exist or develop that benefitthe collaboration. Cislaghi and Heise (2018) state eight common pitfalls in social norm intervention and conclude that social norms and attitudes can coincide. In conformity to the port supply chains, the social norm does not automatically proclaim collaboration, but with the port as the intermediate, the attitude may shift towards participation. This observation was made by Chandra and Hillesgerberg (2017) when they studied governance models in the Port of Rotterdam. Their study generates the idea of improving competition through strategic collaboration that allows companies to agree on frameworks that will increase the competitiveness of the individuals and port in context to other ports.

The European Port regulations limit the possibility for actions within the competitive environment, requiring port authorities to engage in collaborative efforts to influence the port ecosystem. Exemplified, I found that ports do not select the companies that can operate within the port nor decide which cargo or ships may enter the port. The strategic options are, therefore restricted to how the port decides on actions that may develop advantages in the networks, which the ports enviably are part of, and how the competition of the port can be improved in the network through collaboration. The history may be summarised with Weick's (1988, p. 307) statement that "an the enacted environment is the residuum of changes produced by an enactment", which is context to ports can be explained by the relationship between the actions of the port authority and the activities of the company operating within theport. Epitomised, when the port authority decides to invest in larger cranes, there is a possibility for more companies needing access to larger cranes, placing their activities in the port.

Lüscher and Lewis (2008) consider the collaborative process to work through paradoxes and build sense-making that reduces anxiety, escapes paralysis, and enable action. In this context, the role of the port may be to facilitate the framework with the stevedores that will create hyper-collaboration. However, to do this, the participants must overcome the boundaries that Vince and Broussine (1996) argue as paradoxical tensions build on strategically oriented feelings and reactions.

In contrast to Kolk et al. (2018) statement of hyper-collaboration as forming agreed goals to be achieved, exogenous events may escalate the readiness for change. A similar argument is portrayed by Ford and Ford (1994) when arguing that change models are built on logic, contradiction and dialectic. The perspective on hyper-collaboration where participants consider interrelations between events and how these influence worldview and intertwine with past

learnings. This perspective raises the question of whether a positive change in the perceived future can overcome past tensions.

This situation creates a current uncertainty that may shift the power structures among the participating companies, learn from the past and begin the readiness for change of the situation, which Cummins et al. (2016, p. 53) argue to be retro-active in using the essential historical aspects to "think differently for the future of management and human relations". Thus, the historic orthodoxy of the position of the companies needs to be evaluated in contrast to the new reality.

This may be used to evaluate the readiness to change or the proneness to create conflicts among stevedores. This prioritises which participants may be championing hyper-collaboration and which may be avoiding the possibility. Still, it cannot be assumed that change-ready companies can affect those creating resistance. This may be seen in context to the situation with new entrants, where few of the existing ones do not acknowledge the threat and ignore the situation. In contrast, others seek further competitive advantages and possible collaboration. This reverts to Brandt et al. (2017, p.1) the argument that there is "no clear association between experiencing disagreement and experiencing self-conscious emotions, and mental stress". It may be concluded that it is not the adversity and change in the competitive landscape that prepare for the change required for hyper-collaboration.

This conclusion reverts the discussion to the logic behind hyper-collaboration, describing the benefits to the individual and the whole complex adaptive system, herein visualized as the port ecosystem. This ecosystem perspective assumes a causal linkage between the actors and the port and the possibilities to develop their companies within the markets they serve. The stevedores must have a uniform perception of the enhanced opportunity within the offshore wind market, and the port may facilitate this cognitive reality. Boal and Schlultz (2007, p. 414) argue that "rather than work against each other in competition over scarce resources, actors can organise their behaviour such that synergy occurs, their interactions promoting the acquisition of resources to the benefit of all actors rather than any one individual or group".

This argument is the epitome of hyper-collaboration. The past and future relate to operating patterns and influence decision-makers during the path of hyper-collaboration. This relation raises the question of why port operations and collaborations would coexist and simultaneously be beneficial.

2.10 Evaluating the impact of hyper-collaboration

The possibility that hyper-collaboration will impact port ecosystems in Port Esbjerg must be considered. The closer interaction among companies may result in communalised vision that will portray particular worldviews, affecting their surroundings. Contrary, the organisational cultures may also be so diverse that complexity prevents progress. Vangen (2017) discussed the cultural paradox and pointed to the importance of communication in building trust in

relationships. This alignment to create co-evolution was also addressed by Van der Lugt et al. (2014) in their explorative case studies of the co-evolution of the strategic orientation in the Ports of Rotterdam and Barcelona. The empirical analysis of these two ports showed that interdependence and interrelationship affected strategic decisions.

The framework for hyper-collaboration in Port Esbjerg is envisioned to create engagement. Still, as the number of companies engaged in the offshore wind port operation is limited, the cultures and group behaviour can be considered. The situation can be evaluated with different openings and prorogations. The individuals with similar worldviews may already have developed a shared vision or the contrary situation where group dynamics led to disagreements. This might be evaluated with Malenko's (2014) argument that conformity bias existed in boards unless the directors had personal interests dictating otherwise. The suggestion similarly applies in other communities, where communication costs can be high. In context to the companies with a similar vision to decreasecost, there may be an unspoken culture among the peers that suggest engagement is needed from the most influential for the remaining to follow. This culture also necessitates that multiple companies be involved in the decision-making to create consensus, and engagement must be secured beforehand not to jeopardise the outcome. Partner- and collaboration specific communication is required (Vangen, 2017), and one must evaluate the sequence of interaction and realisation of trust issues.

This issue diverts the process towards collaborative strategies, which Clarke and Fuller (2010) argue is a common means to address complex situations that one company can not solve alone while recognising that the stimuli for such social partnerships must be contextual. For consensus to happen, each company must proritise engagement and the port authority must collaborate with the participants representing the companies. Further, it assumes that the port has what Ramsey (2014) refer to the power to define and the relational options, which portray companies as followers in this context. Consequently, a relationship between port and companies must exist that allows for the development of homogeneous goals.

The management in practice can be argued as the development of Lindblom's (1959) theory of muddling-trough, describing companies' reactionary decision-making. This theory may be discussed in contrast to change ideas with indispensable commencement and termination sequences, which display a planned approach. This praxis of contextual change may be plausible in the situation where each company has engaged in the development and thereby accepted an envisioned outcome leading to hyper-collaboration.

From a collaborative perspective, it could be assumed that bounded rationality exists. When one Company observes the benefits of hyper-collaboration, they are expected to promulgated the benefits to peer companies, which then also would engage in the framework. Contrary, if one influential company aborts the idea of hyper-collaboration based on the perceived benefit of the contrary, there is a need for specific information and the port to develop systems that

enhance this exchange, as observed with the development of bespoke IT systems discussed by Change and Hillesgerberg (2017).

The work of Troster et al. (2018) supports the argument that thoughts of quitting affect network changes. The relationship between the companies and the port authority is imperative. Still, the process and the positive perception must seek to develop the solidity to create the change and build the resilience to maintain the change. In this context, Zhu and Ruth (2013, p. 73.) discuss resilience in ecosystems and state that this may be conducted with "dependency, harmonising system development, and strengthening institutional capacities that can identify disruptions early, buffer their propagation, and mitigate their consequence", which lead to the discussion of the sustainability of hyper-collaboration.

2.11 Complexity of hyper-collaboration

The concept of hyper-collaboration is envisioned as a framework, developed and implemented through the engagement of companies in context to the situation. This framework is anticipated to create long-time effects in a business context by opening new market segments in the offshore wind industry. This methodology may be argued as applicable to many theories, where the action is taken to change one situation to another, albeit the techniques of engagement vary. The results are measured, new actions are determined, and the learning, action and review cycles continue until the desired situation is obtained. Conversely, such an approach to change is developed from one standpoint within a system. The actions are constructed with the view of looking from the inside out assembles the constructivist epistemological view.

The idea of hyper-collaboration is from the view of the situation, requiring observation and objectivism on how companies may collaborate and develop synergies, which are beneficial to the individual and the whole system. However, the thinking is different, and discussions centred on modernism, postmodernism, and complexity based on signs, behaviours, emotions and historical reactions in the system of actors are justified. As these are fluid elements, the response to complex systems research would be sustainability in addition to the ethics and morality involved.

Given that the port ecosystem studied is changing with behaviours based on rationality, emotions, and judgments, this will change the perception and learning of the system and the individual and unified position. Engagement from the port authority will result in action and reaction when engaging with the companies operating within the port, but I also have an authoritative role. This may lead to a situation where the responses are different to expectations, which displays the complexity of the system and dilemmas that can lead to ethical and moral concerns. The decision process reassembles the sequence of interactions to achieve the desired change, which is assumed to improve the situation.

The question could be asked if there is the possibility that hyper-collaboration could lead to an unfavorableSituation for some of the companies, and the intervention, therefore, would result in trust breaking down between port

authority and companies. This brings the discussion toward sustainability. In this context, Cosenz et al. (2019) propose a lean systemic method to model and explore sustainable value creation processes in the business model planning. This considers the environmental and societal, and economic value in the business model planning. Developing the framework for hyper-collaboration is essential and highly relevant for the offshore wind segment, which also pivots around job creation and lowering carbon footprint. Conversely, it is also these metrics of the triple bottom line that may promulgate the framework outside the sphere of the participants.

Development must be driven by information, argumentation and collaboration while considering that rhetoric becomes imperative. Hoefer and Green (2016, p. 147) recognised that rhetoric is emotional, logical and concerned with values. They argued that a rhetorical approach "recognises that cognition is limited and, thus, sometimes automatic, as well as sometimes consciously deliberate". This illustrates the importance of developing the framework by engaging and understanding the situation and, through this, creating action. The sustainability of the framework for hyper-collaboration between the companies and the port may initially be the competitive advantage to the ports and the economic benefit to the companies, but also the possibility for future collaborative, innovative developments.

2.12 Research will address how Hyper-collaboration can be achieved as a competitive Strategy

Ports competition is depending on the activities in the hinterland and the efficiency in managing port services. This may explain why some ports handle more goods than others, as they hold a favourable location in the network of goods flow. However, this axiom does not detail how inter-port activities may be developed to increase the port's attractiveness in the network. In this context, it is recognised that ports are complex systems, wherefore, any framework created to increase competitiveness must be contextual. The supply chain within ports contains predetermined and necessary functions for the port to operate, but competition also prevails for some of the services. It is questioned if competition for these services can be reviewed with a conventional analysis comparing the individual companies to each other within the boundaries of the port.

This situation calls for collaboration between the port authority and the companies operating within the port tocreate a framework that allows the individual company to maintain profitability while benefitting the port's competitiveness. Therefore, the phenomenon of hyper-collaboration was introduced to find new managerial praxis in Port Esbjerg will have a significant impact on competitiveness by developing new ways of working together.

2.13 Relevance of the literature review in context to the aim of the research

To create the knowledge to be used in the research, the literature review inherently needed to consider the writing on the competition of ports. In this context, ports were evaluated concerning the external environment, which suggested that many parameters were predetermined by location and hinterland activities. This argument is correct but does not provide a strategic option for ports, as these parameters can not be changed. This also illustrates the difference between ports and conventional business. The port can not re-locate for a more favourable position in the

market. In most cases, ports cannot merge with other ports to enlarge the catchment area, and legislation prevents vertical integration. The remaining option is to reduce the prices, but if this does not change how attractive the port is considered in the logistic network, such an effort will not be strategic beneficial.

The strategy of ports deviates from the traditional view of jockeying between suppliers, buyers, new entrants and substitutes, advocated by Porter (1980) in the five forces theory, as ports are non-movable and highly regulated, and hold a monopolistic position within part of a more extensive network. In this context, it is relevant to consider the literature on competition in a network. Still, as this relates to the attractiveness of an already established position and this research aim to move the port from one strategic situation to another, the nodes in the network need to be reviewed. This pushed the review towards the function of the port ecosystem and the cluster and complexity theories, eventually realising that the situation is bespoke to the port, wherefore collaboration remains the key to enhancing productivity in the port. Therefore, the strategic context of ports is not to develop new services but to create a framework that allows companies to enhance their business, which also benefits the port.

The problem with strategic collaboration is whom to engage with and how this should be effectuated, which the literature on ports gives limited insight into. Therefore, considering the ecosystem and how actors are intertwined in the decision-making must form part of the research methodology. Conversely, the question remains if the literature review develops the knowledge to formulate action if no single theory is used to plot the action plan. Here, the epitome of participative action research becomes relevant, as this requires the researcher and participants in the port ecosystem to create a purpose and interact. Based on such interaction, data and reflection will allow me to formulate the framework for hyper-collaboration, which is considered required to move the port's strategic actions from one situation to another. Port strategy should be considered from an outside view of the port ecosystem, in context to the industry in which the port seeks to gain competitiveness.

2.14 Drawing the port ecosystem for the offshore wind segment

The literature on ports identified factors related to productivity, position, price and hinterland connections, but also the interaction between companies within the port. These companies operate within the confines of the port and its location, which may be considered a competitive environment and be evaluated with the five forces theory (Porter, 1980). To assess the port area as a competitive environment can be justified from the view of the stevedores in a business context, as they have multiple competitors. However, there are also companies in the port with no competition, yet they can not exploit the situation and claim super-profits. Therefore, evaluating the port as a competitive environment has limitations based on the view of the companies. Consequently, it must be recognised that a meta-system of factors prevails and governance exists in controlling the port environment. This may be considered the port ecosystem, and in this context, the diamond matrix (Porter, 1998) may be used to explain the system.

The port ecosystem model was developed using the view that companies must converge on the market possibilities and act accordingly. Comparison can be drawn between the Diamond model (Porter, 1998) and the social-ecological system framework (McGinnis and Ostrom, 2014). Factor, Related and Supporting Industries and Demand conditions mirror the resource units and system. At the same time, chance and firm strategy, structure and rivalry coincide with the situation, while government systems remain similar. The companies and their behaviours should be considered in a business context, wherefore the five forces model (Porter, 1980) has been considered in the port ecosystem model.

Further, it is envisaged that the market conditions can influence the ecosystem, and I believe this causes the behaviours leading to engagement or disregard from the individual company. This decision to join or abandon the set accounts for tacit knowledge representing the obligatory passage point, which Walton (2013) states is the point of access to collective action. The port ecosystem model presents complexity where each company bases their decision on myriads of information. Hyper-collaboration may be viewed as collaboration without coordination, which arguably requires a uniform governance structure that allows the individual companies to evaluate the opportunities and likelihood of success in the current situation. To begin evaluating the current situation, I needed to identify companies which could be involved in creating hyper-collaboration in Port Esbjerg. In context to the supply in the illustrated port ecosystem, the supply chain for offshore wind may be analysed, and the position of Port Esbjerg can then be evaluated in relation hereto. This allows for assessing contextual factors and the correlation between the supply and meta system.

In the literature review, factors affecting port competitiveness were found, and the companies that affected the changeable factors were identified. Then it exemplified how productivity affected the competitiveness of installing an offshore wind farm. The literature review on ports shows that ad hoc studies can be conducted on the competitiveness of ports and how they operate but lack evidence on the interaction that makes this happen. Multiple companies and persons need to collaborate to conduct seamless port operations, and their interaction will be depended on their position and powers relative to each other. The port ecosystem can be used to identify factors affecting port competitiveness and the formative-social-system and boundaries of decision-making between the companies.

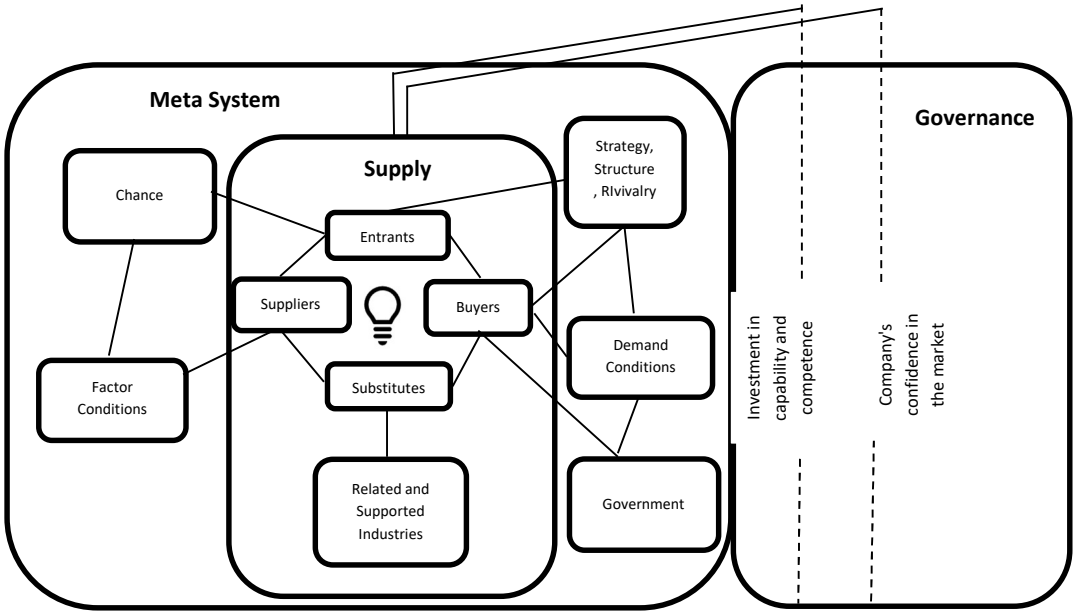

Figure 3 – Port Ecosystem

CHAPTER 3, METHODOLOGY

This chapter discusses the research methodologies before justifying the selected one. The ethical approval, selection, and recruitment of participants are also detailed in this chapter, and the informed consent and voluntary participation are explained. Further, the participant interaction is considered, and the collection of empirical evidence are described with any supplementary exchange envisaged. Finally, the chapter defines the port ecosystem which depict the setting for the research.

3.1 Antecedent to the selected methodology

The research was conducted within the port ecosystem and engaged the formative-social-system encompassing influential participants from companies conducting port activities within the offshore wind industry. The overarching purpose was to increase competitiveness through collaboration among multiple companies. In context, the literature on the competitiveness of ports depicted productivity, price and position as essential parameters. Still, the literature on collaboration between port authorities and companies operating within ports was lacking. Consequently, there was a need to understand the companies' position in the offshore wind industry and how they mutually influence the port's competitiveness over time.

In this context, it was necessary to identify the companies operating within the offshore wind industry and understand how they influence the port's competitiveness. Therefore, fuzzy cognitive mapping was performed to understand how these companies interact. The participants from these companies provided empirical evidence for the function of the formative-social-system and the port ecosystem and contributed to developing the framework for hyper-collaboration. The aim was, therefore, to create a framework that could provoke hyper-collaboration and, over time, develop new ways for the companies to interact and collaborate for the port to be more competitive.

Considering that the companies participating in the research have been competing and collaborating in various settings over a prolonged time, a critical companionship displayed a continuum of mutual and adverse interest, often representing a gap between what was said and done. This learning directed the research towards a person-centred approach, where the researcher has multiple interactions with participants.

3.2 About the selected methodology

To develop a framework for hyper-collaboration specific to the port ecosystem, I needed to include participants who were essential in the decision-making in the companies conducting offshore wind activities. These participants needed to directly influence the strategic direction of the companies and thereby able to influence port competitiveness derived from productivity and price, as found imperative for port competitiveness in the literature review.

The participants had formal and informal relationships from experience, collaboration and competition. To capture participants thinking on how to create a framework for hyper-collaboration, they inevitably had to envision and suggest methods for collaboration. The history added to the participant's intent of action and cognition of the

concurrent situation. The actions in this research needed to be observed and reflected upon by myself and the participants. At the same time, the actions must be constructed to evaluate how this group could act in the symposium. Finally, a precursor for hyper-collaboration had to be identified and observed in action before the framework for hyper-collaboration could be concluded.

My initial process was to learn through interview, which was used to create action. This allowed me to observe, create other actions, and interpret the empirical evidence collected as the research progressed. Syllogisms, deductive and inductive reasoning were used in my search for the dynamics in the formative social setting.

Consequently, the research was designed following the principle of participatory action research, which requires the researcher and participants to engage and perform multiple cycles of inquiry in observing, reflecting, acting, evaluating and modifying. I based the research's epitome on the collaborative effort to develop the framework for hyper-collaboration. In this context Wadworth (1998) reiterates that Participatory Action Research is not only research followed by action; it is research, changed and re-researched within the research process by participants. In the literature review, various parameters related to the competitiveness of ports was identified, and by quantitative data gathered, I found a comparison with offshore wind operations. This made the research relevant, but by incorporating qualitative data from interviews, actions, observations, and reflections, it was possible to understand how hyper-collaboration could lead to competitiveness. The quantitative and qualitative data served the purpose of observing, acting, planning, and reflecting, that coincided with the Participative Action Research method.

The knowledge of the port ecosystem researched in perspective to the offshore wind segment restricts the number of participants in the research. However, it retains the enclosed process required to conduct research with the formative-social-system. Still, the egalitarian approach of participative action research allows social change to be conducted through interaction between participants with known relations. However, it also carries the possibility of status quo, wherefore actions were required, and the following observation allowed me to reflect on the social setting's tensions, signals, and control mechanisms.

In a collaboration between companies, the hierarchical nature firmly exists if they form part of the supply chain, and one, therefore, can exercise power and decide on the participation of others. In this research, the participants represent companies often interlinked by service contracts; therefore, formality did exist. Conversely, this is not the case in all parts of the port ecosystem, where companies share the location while their service is linked only to various port operations. Hence, no single company can dictate the price or productivity of the port ecosystem.

Hyper-collaboration, I envisaged being a new way of working together and the framework for this phenomenon needed to be identified jointly with the participants. The transformation process for offshore wind operations in the

Port led to the knowledge of the formative-social-system and identifications of the participants. These participants could directly influence the competitive factors of the port for offshore wind operations and perform the co-creation of knowledge, plans, action, and change within the research's timeframe. The formative-social-system interaction at a specific time also relates to the competitive situation of the port at the time of the research.

Consequently, it was essential to understand the situations in a formative-social-system that create action and inaction. These situations would inform me of the mechanisms that could be used to enact the participants. Participative Action Research is designed to operate with participants who hold equality and can enter the community with mutual respect to create dialogue and find answers to a common issue. MacDonnald (2012) argued that Participative Action Research was 'variously termed as a dynamic educative process' and 'an approach to social investigation', which emphasise the need to interact with participants but observe their actions in various situations.

3.3 Participative Action Research

To understand participative action research, the statements from Lawson et al. (2015) that this is not a panacea, but methodological pluralism, need to be noted. This pluralism allowed for the construction of a formative-social-system, which would change with enactment. This change is appreciating the dualism involved in my participation, as a member of the port ecosystem. In this perspective, the participatory actions research represented an evolving reality researched over time to understand the actions and reactions within the formative-social-system. Lawson et al. (2015) further argue that participative action research is a "good fit for presenting problems-as-opportunities". I envisaged that the initial commitment to the principle of hyper-collaboration between the participants and me derived from recognised and observed issues.

Participatory action research is a 'qualitative research methodology that fosters collaboration among participants and researchers' (MacDonald, 2012), wherefore enactment must be considered. This enactment directs the attention towards an alliance with participants with similar concerns, observations and desires for change. Lewin (1947) described these people as gatekeepers with some control over society. I deemed this a plausible approach, as this depicted the need to reflect on the role of the participating observer in the formative-social-system. Therefore, I identified the port ecosystem, representing the boundary of the community, before identifying the gatekeepers. Choosing the community based on input from gatekeepers could have limited participants based on their existing relationships, and this would have resulted in ethical conflict.

Lawson et al. (2015) suggested that participatory action research's constitutive and regulatory rules are reiterative. Further, Lawson et al. (2015) state that the recursive process could be structured with a clear purpose in a democratic decision-making workgroup. Therefore, the research involves participants with collaborative goals. One can discuss the purpose of participatory action research as actionable in context to the subsequent solution, implementation and

observation. Participatory action research should lead to enlightenment that guide and inform the participants. This statement suggests that consensus must exist among the participants, which captivates the importance of reflection on the role of the researcher and participants.

Lawson et al. (2015) stated that the second research cycle entails literature review, data collection, and interpretation. I considered this scientific method to draw attention to the grounded theory analysis, which presents induction, deduction and verification. Heath and Cowley (2004, p. 142) stated that "social interaction creates meaning and shaping of society via shared meaning predominate over the effect of society on individuals". This social interaction described the similarity of the scientific research cycles, suggested by Lawson et al. (2015) and Heath and Cowley (2004), as an explanation through data-driven phenomenon in contrast to observing and monitoring the effect of the change effectuated by the research.

This research was developed with participation, collaboration and reflection based on an established goal. The methodology selected considers Kelly's (2005) comparison of traditional and participatory action research stating that the goal is to produce knowledge for the individual and the community contrary to knowledge produced for understanding. The data collection process was constructed early in the research process to gather the information that serves to create the action cycles illustrate below, which led to the enactment of the participants and allowed for evaluation and re-assessment. The reflection on the enactment led to the idea generation for the precursor and later framework for hyper-collaboration.

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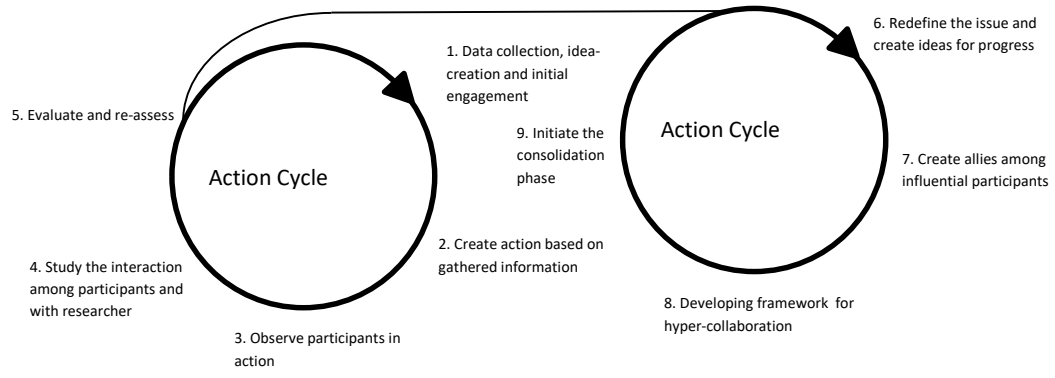

Figure 4 - Action Cycle

The research methodology selected is participatory action research involving learning through change. To create such change with the best effect, I found it necessary to read and understand the formative-social-system, create action, and observe. In this process, I could reflect upon and secure the empirical evidence for developing the framework for hyper-collaboration. Scholarship of Practice discussed by Ramsey (2014) suggests the epistemology of practice dictating engagement, practice and relations phases that gather data in research studies. This debate between theory

and praxis is necessary for developing the action, observation, and reflections specific to the situations and the formative-social-system at the time of the research.

Debatably, participatory action research can provide paradoxes when the knowledge developed by the formative-social-system does not result in the envisioned action or the situation has changed. The reflection and understanding of any action or situation involving the participants become essential for gathering empirical evidence. Conversely, it may also be the unplanned events or planned actions that do not result in action, which can be used to understand the formative-social-system. This understanding affected my view of the anticipated result from participatory action research, where I pursued to reflect on situations creating both action and inaction. Creating a framework for hyper-collaboration can build expectations of what can be achieved. For this to materialise, the participants must mobilise resources to create new ways of working together. In this context, differences between empirical evidence from interviews, communication, actions, and observation, which formed interaction leading to change, became important in the research methodology.

3.4 Discussion of research methods

The research was developed around the change in the social formative system and involved relevant participants, and insight from peer ports. As a new way of working together, this approach recognises that the phenomenon of hyper-collaboration is created over prolonged periods. Hence, a framework could aid in the process of creating the phenomenon permanently. Representing the port authority, I was embedded in the formative-social-system, which would affect my choice of qualitative inquiry and research design. The research idea required me to identify a research methodology where I could engage with participants to develop the envisaged solution collaboratively.

My initial thoughts on research design considered the relevance of ethnographic fieldwork describing social events. In this context, Brewer (1994) problematised ethnographic research as the lack of recognition of the researcher's influence on participants. Brewer (1994) also concluded that ethnographic research is less prone to critique with systematisation and reflection. Conversely, during the literature review, I found that certain competitive factors existed for ports, which could be justified with quantitative data for offshore wind operations. I envisioned that participants would collaborate differently to improve the situation, and a framework could be developed to support this approach. This framework needed to be developed through the cognition of situations and the creation of actions, which required reflective practice to ensure progress. Therefore, deconstructing the events through ethnographic research was not plausible, as my judgment, emotions, and feelings would change throughout the study. The rhetoric could also vary according to my perception and desire to gain progress.

Consequently, action and observation allowed me to reflect on situations and pursue collaborative learning with the participants. The possibility of understanding the history of the participants and how they earlier collaborated was

captured. Considering logic reasoning, I accepted that interaction requires rigour to ensure that participants respond to the same question. Therefore, the interview questions were needed to understand the reaction and provide the possibility to develop actions. However, the interviews did not inform me how they collaborated in various situations. The actions allowed me to observe participants and understand how they collaborated.

Meanwhile, I also created action to observe how they reacted to change introduced by myself or other parties. The change in the interaction with participants over time created the readiness for the desired change. The more frequent the interaction and the formation of a closer relationship created the desire to participate in the change. In this context, interviews portrayed an argument for more rigorous data collection, which led me to explore the inductive approach toward grounded theory, which displayed the construct of a theory based on observations. I found that grounded theory could be questioned in its originality when considering that the researcher ideally should have no pre-conceived ideas of the situation (Glaser and Strauss, 1967). The grounded theory also displays similar problems as phenomenology, considering research in a limited period, with commencement and termination to the situation and concluding the phenomena developing or taking place within the research period. Contrary, practice suggests that an issue may develop from factors outside the reference period or derived from events in the micro and macro environments. The grounded theory collect and codes data based on the situation. When I realised that my research aimed to understand and interact within a social system, which I could influence, I rejected the grounded theory approach.

The change toward studying social systems directed my thinking towards Mol et al. (2017, p. 112) who argue that “The contribution of phenomenology lies in describing a common behavior for events”. Webb and Welsh (2019) recognise that in phenomenological research, the world is not actual but observed through the researcher's lens while noting the requirement for interpretation of the individual's experience in context to the lived experience of the phenomena. The shared experience inevitably required the phenomenon to relate learnings from both past and present, thus providing the relevance for empirical evidence collection. This research aims to develop a framework that allows for a bespoke way for participants to collaborate with interaction, creating the group's cohesion. The framework may therefore not be able to create the desired outcome within the period of this research. This situation would question the trustworthiness of using phenomenological research in this research, so I abandoned the methodology.

The alternative research approach could be a post hoc case study that seeks to create semiotic questions about a phenomenon. The case study approach would have considered the current social setting in a researched situation, which required that hyper-collaboration had already taken place. The case study is therefore subject to similar criticism as narrative research. The methods re-invent stories by constructing what participants know and assuming that actions can be deconstructed with a recollection. In sum, this requires the phenomena to have taken place, and the sampling of the participants from the researched formative-social-system should be encompassing. Contrary, this research

seeks to create untested and new ways of collaboration, coined as hyper-collaboration, and therefore also, the case study method was rejected.

The quantitative research methodologies, comprising narrative, phenomenology, grounded theory study, ethnography and case study, were compared by Creswell (2011), noting that similar data organisation, reading and memoing applied. Debatably, data classification varies considerably from locating epiphanies and developing statements to coding, analysing and establishing themes. This diversity exemplified the shift from reading the situation to the paradigmatic shift of understanding research as a social experience. This advocate that the research should coincide with practice when I recognised that no single theory on qualitative research might encompass the research. The requirement was to allow learning from various research theories to select the most optimal at the given time during the process.

The consideration of research as a relational process, where academic theory speaks into management practice, was promulgated as a provocative theory by Ramsey (2011). This social constructionism, coupled with sensemaking and reflection, dictated learning and reacting. These are essential artefacts for this research, where the formative-social-system were developed from the current situation to the one representing a situation where the participants could agree upon a framework for hyper-collaboration. Conversely, it could be noted that the research is progressive between two events, but the outcome is developed through numerous interactions, discussions, and ongoing testing of plausibility. This directs the methodology toward the selected participatory actions research dictating collaboration and interaction based on actions and reflection.

Participants were considered in mapping the formative-social-system, wherefore it became these participants that linked to the strategic options of ports. The literature review found that there were given parameters, such as the location in the logistic networks, while productivity and cost competitiveness could be developed. In this context, the participants operate within the boundaries of the port ecosystem and represent the group capable of developing port competitiveness.

3.5 Fuzzy mapping of the formative-social-system for offshore wind in Port Esbjerg

The supply chain would not suffice to evaluate the formative-social-system for offshore wind activities in the port, as this considers the activities in a linear perspective from production to installation. The companies involved in port operations are intertwined in different relationships related to offshore wind and other activities. The cohesiveness in factor conditions was that each company operate within the port's boundary and must cooperate in the inbound logistic, pre-assembly and load-out operations needed for offshore wind activities. These activities allow the system to be viewed and mapped as a formative-social-system. The fuzzy mapping allowed me to identify the formative-social-system. This way, the companies in the port were contextualised to the research purpose, and their interaction

was evaluated with the mental modeler (Gray et al., 2013). Furthermore, this allowed for fuzzy-logic cognitive mapping that also identified the participants in this research.

To augment this formative-social-system, the position of Port Esbjerg in the network and the future possibilities must instill the companies' confidence in the market. Further, beneficial conditions and possibilities must exist for a company to engage in collective goals. In addition, each company must have the human and economic capital available to embrace identified opportunities. Therefore, the evaluation of the combination of factors that are given together with possible actions and envisaged outcomes was imperative. Furthermore, the apparent analogy between the companies and the competitiveness of Port Esbjerg justified the evaluation of how these companies interact.

In this context, Hanafizadeh and Aliehyaei (2011) argue that fuzzy mapping 'helps produce a chain of concepts, which define the problem in an integrated form and represent the stakeholders' perception. Therefore, the mental modeler software was used to create the fuzzy mapping that allows for an explanation of the formative-social-system. Therefore, this method can be used to determine influential factors in the supply chain for offshore wind activities within the port. At the same time, the specific requirement for load-out operation for offshore wind allowed me to identify the remaining factors affecting the operations.

The factors are operation-specific, but as operations are conducted within the boundaries of the port, the companies can be identified. The mental modeler allowed me to understand how the factors and companies influence each other and thereby provided the possibility to identify the participants within the companies. Consequently, the mental modeler would also depict any discrepancy between data derived from the quantitative study of offshore wind operations, the empirical evidence and knowledge gained through reflection and analysis. The fuzzy mapping also allowed me to review empirical data from the perspective of the companies' interactions, which could be used when I later observed them in action.

To avoid bias in the fuzzy mapping, I used the factor of price and productivity in the evaluation. This can be justified when considering that the competitive factors identified in the literature review were developed around these parameters. For example, the literature review portrayed the cost of installing an offshore wind farm from various ports. Here I found that the activity with the most impact was:

- The efficiency of the stevedoring companies affected the cost of turbine installation vessels while in port.
- The cost of the inboard logistic was affected by port location compared to production in the hinterland.
- The transport cost from the port and installation on-site depended on the distance between the port and the offshore wind farm.

However, to understand the cost component, details of activities and the relative influence on the load-out cost were determined. From identifying the factors affecting the load-out cost, it can be seen that this combination factor can be affected through collaboration. In context to the argument for collaboration to optimise price in the supply chain (Huang et al., 2016), the data for the relative load-out cost showed that efficiency influenced certain activities, albeit instrumental in the overall cost. This data could be used to identify the activities, but other factors would also affect cost. One such component would be the weather conditions. All the components needed to be included to construct the fuzzy mapping.

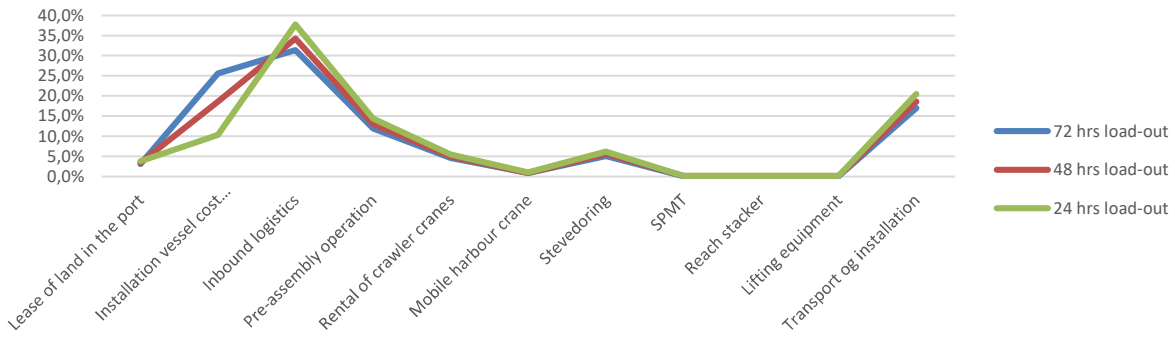

Figure 4 – Relative Load-Out Cost

Henly-Shepard, Gray and Cox (2015) concluded that the mental modeler was suited for understanding the adaptive capacity of social networks and facilitating 'explicit representation of stakeholder group maps, which served as the basis for identifying perceived risks, assets, and values and dynamics of the social aspect. On the other hand, Gray et al. (2020) argued that the 'mental modeler is used to ‘model a complex system with high uncertainty. Commensurate, the metal modeler can be used where fuzzy mapping is conducted of the factors affecting the load-out operation for offshore wind farm installation, wherefore below should be noted.

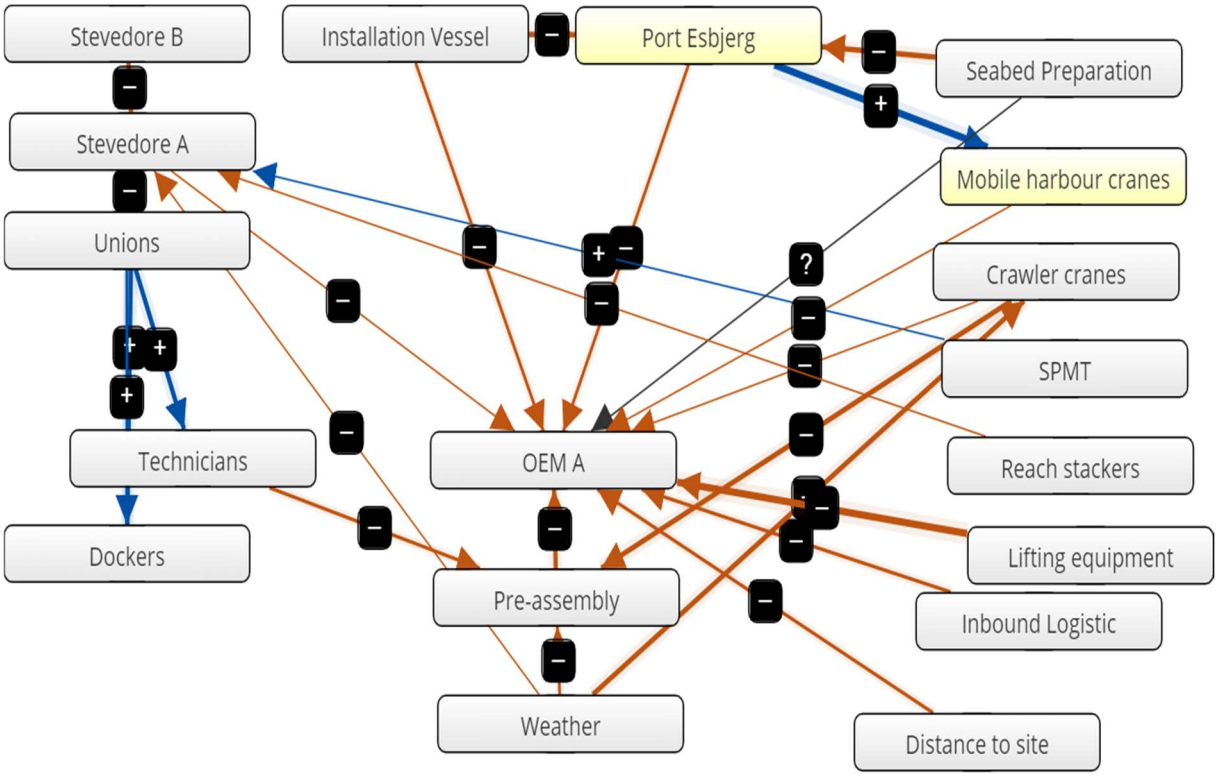

Figure 5 – Fuzzy Mapping

The competitiveness relates to the cost for the end client, the OEM. The position of the OEM can be exemplified when the dockers union negotiate with the stevedores, who again hold contracts with the OEM. The agreement between the OEM and the stevedore requires the latter to hire the dockers, the reach stackers and self-propelled module transporters (SPMT) to perform the load-out of the vessels. Hence, stevedore cost and the actions of the unions and the companies delivering the handling equipment were drivers in the systems.

Another driver was the inboard logistics, as illustrated in the literature review for the installation cost of a wind farm offshore the coast of Nederland. In this case, OEM A performed the installation, and inbound logistics was, therefore, evaluated in context to the network of production facilities. In the example discussed, the production facilities are located 106 kilometres, 277 kilometres and 124 kilometres from Port Esbjerg. Contrary, if the wind farm installation should be conducted from the Dutch port, the major components had to be transported from Denmark to Nederland. This outweighed the cost of the longer passage time with the installation vessel, where the distance to the site, charter rates and the weather implications are drivers. The seabed preparation required to position the installation vessel for the load-out operation in the port is a driver. Commensurate, the drivers outside the control of the port are intertwined with those under control. This depicts the requirement for analysis of drivers' relative influence and how each affects the overall system related to operations for offshore wind.

Therefore, the mental modeler was revisited, and the indegree and outdegree were adjusted following the relative cost. Typified by inbound logistics, which relates to 34% of the overall installation cost, the negative influence for the

OEM is -0.34. This relates to an in-degree of 0 and outdegree of 0.34, as this sequence starts with the driver of inboard logistics. The drivers remain the same, but centrality may be discussed for their influence on how the system is impacted.

From table 5, it is also noted that the unions had the highest centrality, as they were connected to most of the elements. First, they negotiate on behalf of the dockers and technicians, affecting stevedores and pre-assembly operations. The second was the lifting equipment which also is interlinked to several of the companies. Thus, the fuzzy mapping displayed the theoretical power relationship between the companies.

#	Driver	Centrality
1	Distance to site	0.19
2	Cost of SPMT	0.01
3	Inboard logistics	0.34
4	Weather	0.59
5	Unions	1.60
6	Installation vessel	0.91
7	Stevedore B	0.82
8	Seabed preparation	0.50
9	Reach stackers	0.02
10	Lifting equipment	1.00

Table 5 – Drivers and Centrality

The findings display consensus with the literature review, stating that productivity, the port's position, port dues, cost of services and the hinterland connections influence port competitiveness. This also endorses the last factor, described by Merkel (2017) and Merkel and Sløk-Madsen (2019), stating that interactions with actors in the port will improve transactions. Commensurate, it may be argued that port competitiveness is eponymous of operations, but the implementation is analogous to the collaborative efforts of the port authority and companies operating within the port.

The companies included in this research were identified as drivers with the centrality to affect the load-out operation and thus the port's competitiveness. Contradicted, the collaborative benefits that may be achieved thus will ignore the possibility of collaboration with companies outside the port ecosystem.

This question leads to the principal discussion of whether companies can develop hyper-collaboration with each other and continues with the proposition that causal linkage must exist between companies. The opposite view is that companies and the port may benefit from hyper-collaboration with other parts of the supply chain. Conclusively, the framework's objective for hyper-collaboration was to create benefits for the port ecosystem; wherefore, the framework must create possibilities for the companies operating within the port.

3.6 Partnering with the participants in the formative-social-system

So far, the port ecosystem has been identified to understand the boundaries in the companies' decision-making. At the same time, data analysis and the mental modeler were used to identify the companies that would be relevant to include in this research. The possibility of creating partnerships also became relevant to identify the individuals within the companies. McQuaid (2002, p. 2) stated that “while each partnership is a function of particular historical,

economic, social and political contexts, there are many common trends" and identified some of these as strategic, purposeful and crucial actors.

To identify the participants within the companies with high centrality in the mental modeler, it was necessary to understand the partnership that could be developed. I represent the port authority, and the participants companies operating within the port, and conducting operations related to offshore wind. In context to the port operations related to offshore wind, the ultimate beneficiary is the OEM responsible for the fabrication and installation of an offshore wind farm. Therefore, contractual relationships exist between several participants.

Conjectured, if the assumption is that the framework shall improve productivity and cost performance in the port and thereby enhance competitiveness, hyper-collaboration is envisaged to benefit all of the involved parties. The contractual benefits may therefore influence what can be achieved, and in this context, the transformation process related to port operations for offshore wind was developed.

Industry	Sequence	Category	Companies	Location
Offshore Renewable	Fabrication	Inboard logistics	Original Equipment Manufacturers (OEM), suppliers, shippers	Outside the port
	Transport	Pre-assembly operations	Original Equipment Manufactures (OEM), Port of Esbjerg, Technicians, crawler cranes, lifting equipment.	Within the Port
		Load-out	Original Equipment Manufactures (OEM), Port of Esbjerg, stevedores, dockers, cranes, reach stackers, crawler cranes, and lifting equipment.	Within the Port
		Transport to site	Original Equipment Manufactures (OEM), Turbine installation vessels	Outside the port
	Installation	Installation	Original Equipment Manufactures (OEM), Turbine installation vessels, technicians	Outside the port

Table 6 – Transformation Process

The transformation process can be described in the fabrication, transport and installation sequence and sub-categorised in the various activities illustrated in table 8, which relates to the activities in the supply chain. The schematic view of the transformation process coincides with the companies identified in the fuzzy mapping.

The consideration of the transformation process can be justified for the research objective, where companies and port authority together create actions that affect the cost or effectiveness of the port ecosystem and learn from such action to create the framework for hyper-collaboration. This justifies that limitation exists on the number of participants involved in the research, as they must represent companies taking part in the transformation process for offshore wind and conducting their operations within the boundaries of the port.

The praxis for offshore wind farm installation is that the developer contracts with an engineering, procurement, and installation contractor responsible for installing the foundation, transition pieces, and array cabling. In contrast, wind turbine generators are installed by the OEM. In context to Port Esbjerg, only the activities by the OEM are conducted, wherefore the OEM is the end client who directly or indirectly contracts with all the companies identified in the supply chain. Therefore, cost and efficiency may be argued as success parameters, and the persons from the OEMs responsible for port operation are therefore considered imperative to include in this research.

The stevedoring companies move and load out the major components for the wind turbine generators within the port and hire dockers to assist in this matter. In addition, the stevedores also operate the reach stackers and self-propelled module transporters. Therefore, the service from the stevedores deals with multiple components in the transformation process. Consequently, the decision-makers within the stevedore companies responsible for offshore wind activities were included in this research.

The interaction between these participants has been developed and influenced over time, wherefore collaboration may rely on previous agreements or conflicts. For example, Brandt et al. (2017) found that damning effects from conflicting worldviews lead to emotions and negative evaluations of others. This portrayed a situation where interviews, actions and observations could reveal adverse behaviour towards other participants, wherefore empirical data need to consider the participants' history, experiences, and intentions. Moreso, I found it plausible to include peer ports as participants to create ideas and arguments for change if their ideas could benefit the participants operating within the port ecosystem.

All the identified participants were required to bring expertise to the research. Those operating within the port ecosystem should have the longevity of previous collaboration to understand the reactions of each other fully. In this context, it should be noted that participants could be biased on the outlook of their situation, which could affect the worldview of their situation and other participants. This situation exhibits circles of experience, information and emotion and directly links to behaviour. Initial engagement with interviews, creation of action and observation became important in understanding such phenomenon.

I found it necessary to discuss the constraints in the port ecosystem and understand how the various decision processes juxtaposed participants. In the system, the boundary is related to the supply chain. Here, the OEM held formative powers, and the stevedores provided the equipment and personnel to service the OEM. The constraint was the contractual relationship, while it also justified the involvement of these participants in the research. Conversely, the approach may be haphazard compared to the fuzzy mapping, where dockers and unions hold high centrality despite having no contractual arrangements with the OEM. Epitomised, dockers hold high bargaining powers, as their service strongly influences the outcome of the overall operation. Hence, the research captures the view of the dockers' elected union leader.

The participants predominantly constitute the formative-social-system. They were selected based on their centrality in the supply chain in the offshore wind operations in the port, and their involvement in the transformation process for offshore wind installations. In addition, the participants in the research held extensive track records in offshore wind operations. The participants comprised the OEM, three stevedore companies, the head of the dockers union and

two peer ports, which collective would be able to decide on ways of working together and share acknowledgement of setting the new standard that the framework for hyper-collaborate would promulgate. It allowed engagement and learning to occur from an early stage of the research.

3.7 Setting for the research

The research was conducted with relevant participants within the formative-social-system and the learning from peer ports. First, the social setting was considered, and the participants found. These participants were engaged in interviews, discussions and communication via video link, telephone conversation, email correspondence and later in meetings and workshops. The same approach was performed with the peer ports, which avoided travel and physical meetings during the COVID-19 pandemic. Consequently, travel to various sites and physical meetings were not initially considered due to the situation. Still, it was deemed imperative that the initial engagement was with a video link that allowed interaction and two-way communication on subjects related to hyper-collaboration.

This communication allowed me to create the first deliberate and emerging actions. The actions created developed various responses, which I could observe. I realised there were situations where the participants would act and others where inaction was the result. Further interaction and observations to identify and understand the structures leading the situation were conducted, thus allowing me to be reflected upon situations in the formative-social-system. I evaluated these observations against the direct communication with the participants to understand their behaviour in their interactions.

The participants' behaviour could be assumed to be influenced by the history, norms, ethos, and tensions. Such a phenomenon contradicted the port ecosystem that depicts the power relationship based on rational factors, such as the effective cost of services. Thus, the port ecosystem assumed rationale between factual conditions and decisions; a causal relationship exists to allow this to happen. Contrary to the logical flow of decisions, the history between participants depicted that cooperation, collusion and conflict had occurred during their relationship. In several cases, the conflict may even have resulted in a crisis.

This justification for observation would lead to a discussion on which observations to include and which to ignore. Here, the understanding of hyper-collaboration as a self-regulating phenomenon is essential. It meant that when actions needed to be taken in the formative-social-system, one should expect an inevitable outcome. In situations where participants acted unexpectedly, learning the dynamics of the formative-social-system could be obtained.

To conduct this research, I needed to understand how the formative-social-system reacted to unplanned events that included the participants, while I also needed to create actions. This combination of what I envisaged to create action with a planned outcome and learning the participants' behaviour in various situations envisioned the framework for

hyper-collaboration. This research commenced with interviews to understand the initial social structure before commencing the democratic approach toward participative action research.

I deemed it necessary to create action and observe the participants in the ensuing situations understand their reactions to the formative-social-system. Commensurate, the empirical evidence used in this research is a mixture of data derived from numerous interactions, collaboration, action and observation, which needed to be collected and established through a partnership with the participants. In this context, I found that contractual relationships between the participants, and my role representing the port authority, were influential in activating the participants. The data collection process was conducted from August 2020 to August 2021.

3.8 Ethical approval of the research

The ethical approval of the research was given by the University of Liverpool, Committee on Research Ethics on the 27. July 2020.

3.9 Selection and recruitment of participants

The participants were selected based on their role in achieving the research's objective. This selection created the sphere of relationships needed in action research. I based this on the supposition of knowing the participants' position in the baseline for collaboration. This group of participants also allows for crowd solving, as the participants acknowledged the goals of the research.

Participants from two peer ports were also included in the research to find inspiration for the change. These participants were selected to explore if they have introduced systems to enhance collaboration, thus providing empirical evidence of their progress. This envisaged the learning and bias for action required in Port Esbjerg to facilitate change that could be used to develop the framework for hyper-collaboration.

The participants were initially approached by email and provided with the information sheet. The participants submitted and signed the consent form upon their acceptance to participate. Hereafter, interviews, discussions and reflective practice commenced. Considering that this study endeavors develop a framework for hyper-collaboration, the question can be raised to which participants from the companies in the social-formative-system should be included in this study. Here, the decision-makers for the activities with each of the companies was selected. They all held industry relevant experience from the offshore wind industry in management positions and this made their engagement relevant to the research question that pivots around competitive advantages in the offshore wind industry.

The education levels of these decision-makers depicted mid- to higher level of education ranging from degree apprenticeships, bachelor to master degrees, which illustrated some form on evenness among participants. This situation may enhance dialog but would also reduce the diversity. Therefore, the inclusion of all the stevedore working within the offshore wind segment in the formative-social-system allowed for some form of triangulation in understanding their relationship with Port Esbjerg, Union and the OEM which all hold formal powers towards the stevedores.

The comparable education levels of the participants combined with the diversity of all the decision-makers of the companies in the formative-social-system will reduce the influence of external variables. Therefore, two peer ports was included in this study, as they may present references for ideas or solution that could be tested in the social-formative-system in Port Esbjerg. In this context it must be recognized that it is the change in interaction of participants that eventually will lead to hyper-collaboration. Consequently, the participants collectively had to be able generate new knowledge and act, which presented both barriers and enrichments when evaluating the participants.

The participants were part of the social-formative-system in Port Esbjerg, with exemption to the two reference ports, and the overall goal of competitiveness of Port Esbjerg would be apparent. Further, they participants from the social-formative-system had inter-dependencies as they had contractual obligations towards each other in various form. These contractual obligations could have been argued to be hindrance for exchange of ideas in developing the framework for hyper-collaboration, but they comparable education levels would depict that exchange of knowledge would be standard operating practice.

Id	Company	Participant	Industry experience	Education level	Contractual interaction
1	OEM	Manager of Port Operations	12 years	Bachelor	Contract with Id 2 and 3
2	Stevedore A	Director of Offshore Wind	4 years	Masters Degree	Contract with Id 1, 5 and 8
3	Stevedore B	General Manager	20 years	Degree apprenticeship	Contract with Id 1, 5 and 8
4	Stevedore C	Manager of Operations	20 years	Degree apprenticeship	Contract with Id 1, 5 and 8
5	Dockers	Head of the local union	10 years	Masters Degree	Contract with Id 2,3 and 4
6	Peer port A	CCO	15 years	Masters Degree	None
7	Peer Port B	CEO	-	Masters Degree	None
8	Port Esbjerg	CEO (researcher)	6 years	Masters Degree	Contract with id 1, 2, 3, 4, and 5

Table 7 – Identified Participants in the formative-social-system

In sum, the participants are interlinked through their operation in Port Esbjerg, presenting the formative-social-system, and the possibility of knowledge transfer from peer ports. These participants provided the possibility to engage in the metacognitive process during the research, which allowed for reflective practice. The participants and I jointly analysed and rationalised the actions while developing the framework for hyper-collaboration. This objective was given, albeit the process of achieving this was framed and re-framed by myself and participants in a social reconstructionist approach.

3.10 Informed consent and voluntary participation

The research supervisor reviewed the informed consent and accepted it with ethical approval. Finally, the informed consent was submitted to the participants with email solicitation and the information sheet. This information sheet explained that participation would involve discussing the opportunities for developing the framework for hyper-collaboration in Port Esbjerg. At the same time, it exemplified numerous questions entailed in the initial interviews. Further, the information explained how participants were selected and noted that contributing to the research was voluntary. In contrast, the research methodology and the anonymisation process were explained, and details of the research supervisor were given if participants sought to direct complaints or withdraw from the research.

A telephone conversation followed the initial approach by email to receive the signed consent before further interaction. The researcher retained the signed consent, while a copy was sent to the participants for their records.

3.11 Consideration of participant interaction

To develop the framework for hyper-collaboration, I performed reflective practice throughout the process, considering Schon's (1987) principle of 'knowing in action, 'Reflecting in Action' and 'Reflection on Action'. My research dictated collaborative effort to reach the aim and common goal and thereby also problems, which needed to be agreed upon for participants to interact and develop the framework. My assumption was that plausible solutions may be tested, reflected upon, changed and implemented quicker when goals are agreeable by the participants.

The end goal was to develop a framework to enact the participants toward hyper-collaboration. To conduct the research, I needed to understand and reflect on how the participants, and I reacted to various situations. Further, I needed to create actions with the participants to understand how enactment could be developed within a formative-social-system. In this context, the design science research model of Rensburg and Goede (2019) was considered, as it was understood that participants held records of previously prolonged interactions and were already working together in established contractual relationships. Furthermore, Rensburg and Goede (2019) consider artefacts as constructs, models, methods and instantiations and propose these be designed to generate specific knowledge. Therefore, the initial knowledge gained during this research was intended to construct a different possibility of the interaction between the participants based on changed beliefs, which entailed agreeable goals.

The construction of knowledge aided in creating the reflective cycle also raise anxiety, as my assumptions may be built into the process. The participants' and my constructed reality may be different, and the intention of the interaction could create unexpected reactions. Löhr (2008, p. 4) falsely discusses the mismatch and constructionism, stating that 'it is difficult to see how theories of concept acquisition and social constructionism that cannot explain how we can think about socially constructed kinds could be successful". In this context, this research would be prone to mismatch if the selection of participants did not consider the individual relationships.

Determining the homeostatic cluster by selecting participants with interwoven relationships, and working within the formative-social-system, is likely to ensure similar worldviews and alignment of goals. Consequently, there was a requirement to construct the reflective practice in conformity to the interview process and questions while also developing actions that embed the reflective practice into the knowledge building necessary to reach the aim of the research.

The research, therefore, advances on current forms of interaction in the formative-social-system while also learning from peer ports. This display a possibility for triple-loop learning that allows participants to contextualise hyper-collaboration and interlink the individuals to the research objective. Noting that the actions of the participants and Peschl's (2007) argument that change needs an 'enabling space' free from function, purpose, and goals, the interview, therefore, commenced with the initial questions of what would cultivate the phenomena of hyper-collaboration.

3.12 Data collection

Participatory Action Research is about learning from a living experience. This also means that we receive and give information in many different forms. To collect the data from experience, I found this entailed qualitative data in form of interviews, actions and observations, conversations, meetings, workshops, emails and notes. Further, a vast amount of qualitative data in the form of reports, and various models developed in-house for business purposes.

I commenced the research by interviews with OEM A, Stevedore A, B, C and the dockers union representative, which depict the formative-social-system and two peer ports. The participants within the formative-social-system concurred with those identified in the fuzzy mapping of the social system, thus confirming the boundaries of the ecosystem being studied.

From an epistemological view, I found that the propositions made from the empirical evidence needed to be justified, as the research included a limited number of participants. I, therefore, considered syllogism and deductive and abductive reasoning to combine the premises and test the plausibility of the precursor for hyper-collaboration, which would support the development of the framework.

To understand how enduring change could be conducted in the formative-social-system, I gathered a plethora of empirical evidence from observations in settings related to events in the port ecosystem and thematised the phenomenon observed. Subsequently, I charted commonalities, behaviours, and emotions displayed in the situations and evaluated these in context to the coding of the interviews. The observations encompassed persons within the formative-social-system and presented my conceptualization and evaluation of the situation.

In participatory action research the researcher and participants are working together on an issue, and about understanding social systems. I concluded that several situations must occur to understand how a formal social system reacts. These situations can be planned with action decided by the researcher, or the researcher can decide to observe the participants in action. This duality in action research serves the purpose of understanding the researcher's role in the formative-social-system. The method for engaging with participants and collecting data is portrayed in the research process, where the initial point is the interviews.

The interview had to be conducted video call given the COVID situation, which to certain degree prevented observing telltale signals of the participants, but also presented the advantage that the interviews can performed on neutral terms. This could create the openness and idea generation required at the early stage of the interviews. Exemplified, I represent the port authority and if interviews was held in the port offices, which could have been deemed cohesive towards my owns ideas for hyper-collaboration. Structuring interviews and ensuring levelness though video calls was necessary due to the ongoing pandemic, but also aided the process.

More problematic was the following sense-making and further data collection, which then had to be performed with telephone conversations until the time restrictions derived from the pandemic was lifted. A telephone conversation is evenhanded and does not require same engagements as physical meetings or even video link. One may argue that a fruitful telephone conversation requires both parties to have same focus on the subject at the same time, as one party has no possibility to observe the other. In a sense-making perspective the understanding of ambiguous data may be improved with the social-interaction which the pandemic prevented. To aid the interview and subsequent sense-making, the allegory of hyper-collaboration had to be visualized and imagined by the participants, wherefore the idea and question of this study was introduced early in the semi-structured interviews.

3.13 Interview questions

The interview question had to serve the tree purposes of inclusion, interest and ideas. 1. The participants had to feel that they were selected especially for this study, as this could create the trust required for participative research. 2. The participants had to be intrigued by the term hyper-collaboration, as this had to make them think of involved in developing the framework could benefit the company their worked. In this context, I had selected participants which could be instrumental making a change within their respective companies, but also with the experience and knowledge to understand that learning together could benefit them individually. 3. The interview should also be used to generate the ideas for hyper-collaboration, which I could use to create action.

The interview protocol partly considered Easterby-Smith, Thorpe and Jackson (2013) practical issues of obtaining thrust, social interaction, appropriate language, location and recording of interviews, but given that the interview was conducted on-line during the COVID pandemic restrictions applied. This affected the social interaction conducted

during the interview and following communication, until restriction was lifted. Conversely, frequently interaction with participants in the day-to-day dealings in the port alleviated the importance of observations during the interviews. It was more important to understand the response to the question that observing the reaction from the participants.

Commencing the interview, the social bridge was build enforced with the participants, as they detailed their background and experience. Then the questions regarding hyper-collaboration was enabling the participants to raise their opinion and ideas, but also served to promulgate that such phenomenon was create tangible benefits to the companies involved. This related the interview questions to the management / business problem summarized as the need for companies in the port to work together in new ways to increase the competitiveness of the port. Therefore, by creating the sense that participants were selected to find ways to create hyper-collaboration could initiate the impactful coalition need for participatory action research.

Equally, the literature review confirmed that interaction to improve transactions was competitive factors for ports and following this trail in the literature review, considered the network exemplified with the port's hinterland connections and the spatial cluster operating within the port, prior to considering hyper-collaboration. To initiate similar thought-process the interview questions sought for empirical evidence of earlier hyper-collaboration, as envisaged by the participants, as well as prompting questions on how hyper-collaboration could be achieved and who should participate.

Commensurate, the interview questions served to confirm the interest of the participants taking part in the strategic initiative in the port on hyper-collaboration, but also to uncover suggestions and hindrances for creating the framework given that the port authority has no formal power to dictate hyper-collaboration. The interview questions portrayed the challenge of leading without power, as they prompt trust, dedication and transformation by circling around the notion of hyper-collaboration.

3.14 Interview protocol

The interview protocol considered the three processes of Galletta (2012), described as opening, middle and concluding segments. The opening segment prompted and elicited the participants' experiences related to the research objective. Then, the questions allowed the participants to display their knowledge in context to the phenomenon of hyper-collaboration while progressing through the deeper considerations entailing judgments, emotions, and conjectures towards the research objective. This allowed further analysis of the interviews to consider the formative-social-system and interactions between participants that could facilitate actions.

The approach with interviews was purposely selected to allow for open dialogue and two-way communication. Furthermore, the order of questions was selected based on how this may provoke action learning. This created what Peschl (2006) refers to as an epistemological process that merges cognition and environmental dynamics into profound understanding. The interviews were semi-structured, and the intentions and considerations would later allow me to generated ideas for action.

Segment	Question	Intention	Consideration
Background of participant	What is your job in the organisation? How long have you been employed with the organisation? Where have you been working for the organisation? What led you to work within this industry?	To create familiarity needed for the partnership between researcher and participants.	This part created the legitimacy of partnership, while also trust plays a pivotal role and is obtained between researcher and participant.
"enabling space"	How do you understand hyper-collaboration? What do you see as the pros and cons of hyper-collaboration? Why do you think hyper-collaboration has not been introduced into port operations earlier? Where in port operations do you think it would be advantageous to the overall competitiveness? Who do you think should take the lead in implementing this?	The intention was to probe the participants' thoughts about hyper-collaboration and create some form of shared vision, but also to understand if similar praxis has been used before	A similar worldview or shared goal can be developed if the participants actively engage with the objective of hyper-collaboration
Opening	Which areas do you think it may be beneficial to collaborate in? Which companies within the port do you think this could benefit?	This is the idea-generating phase, which would indicate that the participants have acknowledged that hyper-collaboration could be achieved.	The idea generation phase would later allow me to follow Galletta's (2012) argument that interviews should be field-tested, and trial and error should be considered while connected to the research question.
Middle	How do you consider a framework for collaboration to be relevant? Tell me about your experience with collaboration between peer companies? How do you envision that hyper-collaboration may be created?	Engaging with the research member to gain knowledge	This is the idea generation phase, where ideas can be formed for creating the initial action in the research
Concluding	Which companies do you think would benefit from hyper-collaboration? What kind of evidence do you think would help create hyper-collaboration? How do you think a tender platform may assist in developing hyper-collaboration? Which companies do you think should be included in this research?	Accountability of the participants, as part of the research community	This aim is to imagine a solution or contest some of the parameters Kolk et al. (2018) concluded to be crucial for hyper-collaboration. This allows for critical reflection in an early stage of the research.

Table 8 – Interview Questions

3.15 Data from actions

The interview was used to create the first action, and the discussion of the result led to cycles of inquiry, which again resulted in other actions, observations and reflections. The action was planned from the knowledge gained through interviews and conversations with the participants and emerging from situations occurring in the port ecosystem. The benefit of observing actions was understanding the dynamics of collaboration in the formative-social-system and my role in creating change.

3.16 Data from observations

To understand how the participant reacted to various events, I found it necessary to observe their actions in situ. This was done by selecting events requiring collaboration to progress in situations that presented issues. These situations could entail outside parties interacting with the participants and myself or interfaces between the participants and myself. This allowed me to evaluate how participants reacted to various situations and identify how they viewed my role in situations where I was embedded and acted.

To understand where observation would be relevant, I found it should observe a situation affecting several of the participants included in this research and portray a situation where they had to act. The situations should both be where I was involved in the decision-making and where I was embedded in solving the situation, as well as a situation where I was not able to create action. This allowed me to observe in action.

3.17 Coding and Analysing of data

The empirical data were coded. This coding assisted me in developing the action and cycles of inquiry. In addition, this approach for the coding was adopted to ensure engagement from the participants. Thus, there is a causal linkage between my reflection and the participants' acceptance, eventually leading to action.

Thematic analysis was performed of the interview data. In this context, the development of the semi-structured interviews where similar focus was pursued through the allegory of hyper-collaboration increasing competitiveness. This process dictates the categories of world view and relevance, where marked conditions and cost reductions was noted in the interviews. Other categories related to hyper-collaboration, such as behaviour and change was selected, while also the actors involved, and their competencies was selected as categories. Finally, a framework for hyper-collaboration can not be realised without the adequate conditions in the formative-social-system and leadership. The exempla could be draw to the contractual relationship between participants where the interview had to reveal is such relationship create hindrance for hyper-collaboration to occur, and if so, who has the leadership to change the situation.

Thus, the data coding provided the stewardship to create the next steps in the action cycles. The categories and notes from the interviews mentioned by most participants was considered highest likelihood of consensus. Exemplified, by

the category of change, where all participants argued that collaboration should be organized and in the category of leadership, the majority agreed that this should be performed through knowledge sharing. My following sense-making process would then be to organize situation where knowledge could be exchanged and systematized and observe and analyse the Data from such event.

3.18 Qualitative data

To underpin my arguments and to understand the potential for hyper-collaboration quantitative data was critical. This could be an analysis of competitive parameters for the port and participant, which would aid in creating a similar worldview and fact-seeking data concerning the offshore wind industry that this research pivots on.

3.19 Data rigour

The multiplicity of data derived in this study justifies the discussion on rigidity, especially considering the interwoven environment of the port ecosystem and the participants, which portray the requirement for mixed type og qualitative and quantitative data. In context to data rigour, the criterias from Lincoln and Guba's (1985) depict the four dimensions of credibility, transferability, dependability and confirmability, which are evaluated for this study in context to trustworthiness and authenticity in naturalistic evaluation discussed by Schwandt, Lincoln and Guba's (2007, p.17), where they consider inquiry as "multiple realities that are social constructed" and concede that "inquiry is incapable of producing nomothetic knowledge but instead only idiographic working hypotheses that relate to a given and specific context". Thus, Schwandt, Lincoln and Guba's (2007) implicitly abandon the criteria used to test rigor in the conventional scientific meaning and explore trustworthiness of the data creating the situation.

Situations result from social constructs, which in this case interwove multiple actors within the port ecosystem and together they have a possibility to influence the data collection. The provocative theories depict an example of how experiencing a situation will result in specific sense-making based on the knowledge ad concurrent experience of the researcher. This praxis shifts the focus on data rigour as the possibility to replicate findings if the same situation occurs, to authenticating the situation.

Prolonged engagement in the research and persistent observation are key aspects that relate to concurrent experience that will generate knowledge of both researcher and participants, while authentication arguably is entrenched in participative action research. In participative action research the social setting together derives at solutions to the business /management problem and thus provide the researcher the possibility to answer the research question. In this context data rigour in depending on series of enactment, observation, experience and validation, which can be related to Schwandt, Lincoln and Guba's (2007) approaches to credibility, transferability, dependability and confirmability.

Criteria	Approaches proposed by Lincoln and Guba's (2007)	Approaches applied in this study to obtain rigour including series of enactment, observation, experience and validation
Credibility	Prolonged engagement	• The study was conducted over period of more than one year and involved participants and researcher enacting in various situations. Moreover, previous relationship between the participants and researcher exceeded three years. • The combined interaction of the researcher and participants commenced before and beyond the period of the study. This continuum improved enactment and experience.
	Persistent observation	• The action and observation in the study included both in-situ observation as well as situation where the researcher was instrumental in the action and situation where participants caused the enactment • Multiple action cycles were conducted involving both action, inaction and observations, which presented a validated situational outcome
	Triangulation (cross-checking) of data	• Data methodologies ranged from interview to observation and action collected by a plethora of methods comprising interviews, conversations, workshops and meetings. The role of the facilitator varied between external, the researcher and participants. • The transcripts were validated with the participants, which had been involved in the interviews, while the coding was reviewed by first and second supervisor
	Peer debriefing	• A series of workshops was conducted that involved the participants in developing the precurser for the framework for hyper-collaboration, which constitutes the research question. • The use of the influential advisory board was used to test the precursor for the research question
	Negative case analysis	• The events described in the actions and observation included situations, where both planned and unplanned response was achieved.
	Member checks	• The sense-making process included various participants during the study, but also the Advisory Board was used in seeking acceptance of the precursor selected for the framework for hyper-collaboration.
Transferability	Thick descriptive data	• Triangulation was used in making the arguments from the qualitative data, as this was in several cases underpinned by quantitative data. Together this formed a cohesive process that allowed conclusions to be made and used to answers the business /management problem of competitiveness of offshore wind ports.
Dependability and Confirmability	An external audit (data and reconstructions) which results in a confirmability judgment.	• During the study detailed log was prepared and where interviews was used, the participants was required to verify the correctness of the transcripts. The data collection process and subsequent was systematized and linked to the research question, which also required the mix of qualitative and quantitative data.

3.20 Supplementary interaction

In the chosen participatory action research methodology, each participant contributed unique knowledge about the situation. Thus, the formative-social-system involving the participants was observed in various situations where the action was created with the participants. I considered this approach necessary to understand if the participants' opinions deviated from how they acted within the confines of interviews, meetings and conversations. Participants would interact with me to assist in generating ideas for the subject. However, they would also participate in the following action and later discuss how the implementation of the framework could be conducted. The participants provided an insight into the port ecosystem and the formative-social-system they were operating within. Several observations depicted how formative social powers were contemporary and would change with the situation. The

decision-making was based on both historical and present conditions, and my engagement often allowed for actionable knowledge to be collected.

It was essential to understand how the formative-social-system could be changed to make the phenomenon of hyper-collaboration known to the participants. My engagement was required when conceptualising the situation among participants; thus, email exchange, and notes from phone conversations, workshops and meetings notes will form part of the supplementary action in the research. This creates continua for the research, facilitating communication through several channels over time. This was deliberate, as trust needed to be created between myself and the participants, especially when considering our intertwined activities. As stated in the ethics application, contractual relationships existed between the researcher and participants, representing the formal relationships.

In this context, the longitudinal research was conducted over twelve months, albeit participants already had business relationships for years. This history was imperative in creating the trust needed for the open dialogue in participatory action research. These interrelation domains in a working relationship were discussed by Hardiman and Dewing (2014), stating that this may be a barrier to learning. Empirically the contractual relationships embodied the mutual interest in creating a framework for hyper-collaboration, which was considered beneficial to all participants. Still, praxis dictated that learning must be formalised to create actionable knowledge. This collaborative learning needed to consider my facilitating role as the researcher and the reflective practice adopted when analysing the interaction with the participants.

3.21 Reflective practice

The research included multiple forms of quantitative and qualitative data, comprising analysis, coding and observations of the discussion of actions. In addition, empirical evidence was collected by information exchange with the participants. Finally, this information was collected and sorted for sensemaking.

This approach can be justified in the reflective practice. Here, I was thinking about action (Dewey, 1933) and how this inevitably could be influenced by the researcher's action. Schön (1987) emphasised the levels of reflection-in-action and reflection-on-action, which are related to the role of the researcher. In this research, I was intertwined with the social system, and the learning and knowledge are thus influential in the reflective practice.

Consequently, this was discussed in the action, reflection and sensemaking. This praxis was imperative in making the reflective practice collaborative as the core of the action learning process that this research evolves around. This resulted in the ideas and the subsequent reflection-on-action.

The reflection-on-action allowed me to understand my role and influence in the formative-social-system and what participants would expect from me when developing the framework for hyper-collaboration. I found this reflective praxis valuable in understanding how the formative-social-system could be enacted. Thus it taught me the difference between being able to create action and understanding that enactment can be achieved without my presence. According to Torbert (2001), action inquiry has a first-, second and third-person approach, but I found that I assumed different roles in various situations in this research. This exemplifies the complexity of research on change in social systems. In this research, it became imperative to understand if the shift from one situation to another could occur without my involvement; therefore, I had to reflect on my own and the participants' actions.

3.22 Research Process

The research process can be illustrated in the input, transformation, and result sequence. The action inquiry takes place in the input sequence, where the method is semi-structured, data is collected, and the social system is constructed. At the same time, participants are engaged in creating action, which was used for observation and reflection. The input sequence is also in-situ observation, which allowed me to observe the correlation between information, intention and action of the participants and myself. This process was crucial to understanding the function of the social system and constructing the idea for the precursor for hyper-collaboration created in the transformation phase. The idea for a precursor for hyper-collaboration was developed, noting the participants' responses, and discussing and adjusting before concluding before proceeding to the transformations phase.

In the transition phase, the precursor for hyper-collaboration was verified and tested, as this was an essential artefact for creating the framework. I envisioned that the successful testing of the precursor would gain the participants' acceptance and thus make the formative-social-system ready for change. The promulgation of the idea of hyper-collaboration was imperative for the result sequence of the research process, noting that the enduring change towards hyper-collaboration would take time to develop. The result sequence, therefore, set out to conclude on the framework, which needed to be constructed to operate within the confirmed port ecosystem and be promulgated to the participants for ongoing implementation.

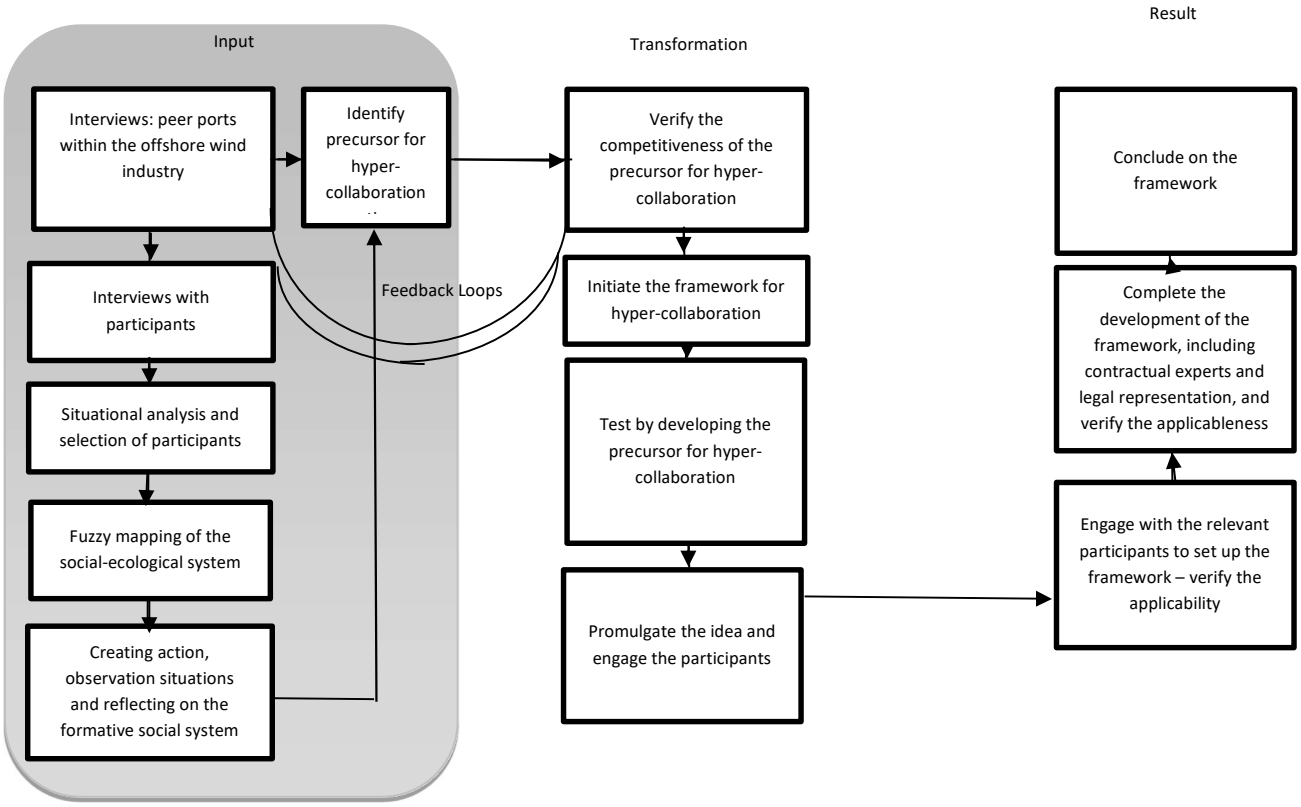

Figure 9 - Research Process

CHAPTER 4, COLLECTING EMPIRICAL EVIDENCE, REFLECTION, SENSE-MAKING AND IDEA GENERATION

This chapter describes the collection and review of empirical evidence constructed upon the research process described in the previous chapter. The method used was participative action research among the selected participants. The data collected during participant engagement were coded to assist in own reflection. The encompassing purpose was to understand how this group of participants could be engaged and act together, and this allowed me to develop the idea for a precursor for the framework for hyper-collaboration that could be tested.

4.1 Planning for action

This research used the participatory action research method to create a concerted approach with the participants. This approach required the participants to develop shared goals and be conjoined in their activities, operating under formative norms and rules. This was relevant to the vexing issue to progress the systematic investigative approach. However, before engaging in participatory action research, it was imperative to understand if the participants comprised a coherent group capable of democratic decision-making.

Concluding on the group of participants, my research was conducted in distinct action, observation and reflective cycles developed in an initiative and recursive process. These review cycles also developed my reflection on the empirical evidence and how the participants interacted in various situations. The purpose was to understand participants' reactions to change and eventually construct situations that could lead to enactment among participants and enhance collaboration. Thus, the participative action research methodology followed the arguments of Kelly (2005, p.69) to "Beginning a PAR project involves a balance between presenting ideas developed from a formal community assessment and working with community groups on the creation of priorities or strategies".

The participants comprised OEM A, which held contracts with the Port, Stevedore A, B, and C. They all hire dockers from the same union, where the representative also was interviewed. The Stevedores and OEM A relationship has developed over a decade with various contractual relationships and degrees of interaction. This approach may be unique to Port Esbjerg, albeit comparable with operations in other ports. Hence, two peer ports, Port A and Port B were interviewed to compare their collaboration experiences.

Before commencing the interviews, I envisioned hyper-collaboration where stevedores could share their resources, Thus, I considered it essential to examine if the participants had a similar view on hyper-collaboration. One of the questions in the interviews was 'how do you understand hyper-collaboration'. Stevedore A answered 'I see this as courage for competitors to work together, while Stevedore B responded with previous experience establishing a company to capture a new market. The same arguments were given by Stevedore C, who referred to the collaboration to enter the offshore wind market twenty years earlier. OEM A conveyed the need for the suppliers to collaborate to provide better service. The two ports had various approaches, where one argued for ports to collaborate, while the other noted the previous experience of integrating multiple services into their operations. I stressed during these

interviews that there appeared to be a mutual understanding that hyper-collaboration was something more than their daily interaction, for which I found consensus with the participants. The interview confirmed that participants were willing to take part in developing the framework for hyper-collaboration.

The Interviews also depicted earlier history among the participants when asking why hyper-collaboration had not been introduced into the port operations earlier. Stevedore A mentioned the tough competition prevented the discussions among peer stevedore companies while noting that earlier difficulties sharing equipment among peers had been unfruitful. Stevedore A then argued for collaboration on safety standards to prevent incidents and suggested a unified approach to contractual risk.

Stevedore B stated that they considered themselves ahead of the competition and did not consider assisting Stevedore A. In contrast, Stevedore B pointed toward the perceived benefits of hyper-collaborating with leasing companies owning the handling equipment needed for the offshore wind industry. This equipment was also identified in the fuzzy mapping. Stevedore B mentioned to me that they earlier had success with collaboration among peers. Still, later approaches to other stevedores have been in vain, hence their suggestion to include sub-suppliers. This learning exemplifies how the rationale from both Stevedores differed. Stevedore A would benefit by collaborating, while stevedore B considered such detrimental to their competitive advantage. Nevertheless, stevedore B still blamed the other stevedores for collaboration not taking place. OEM A also noted the issue of collaboration among stevedores, but advocated bringing a new stevedoring company to the Port to increase competition.

In essence, the stevedores acknowledged the potential benefits of collaboration by sharing resources but offered no indication of pursuing such possibilities. The situation depicted Grundy's (2006) argument that competitive rivalry is a function of commitment to the market, the number of players, strategy and disposition and similarity to or difference from one another. This rivalry was evident when OEM A had expected stevedores to collaborate. In contrast, stevedores approached this situation in conformity to what could benefit their situation. The interview with the union representative revealed a similar argument for enhancing the competency of dockers, as this would improve their bargaining position.

I realised that each participant considered hyper-collaboration as an action initiated by another participant to benefit the others. Therefore, the interviews did not have the intended outcome. I felt the participants' history and previous experience were influential in reaching their arguments and decided to explore this. The response from the participants appeared to be based on the power structures among them, and the proposed actions could have originated from their formal relationships. Turner et al. (2013) advocated the heuristics of a community to change behaviours and stated the necessity of a system, which can influence through awareness of their contribution. This ability to control was not exercised by OEM A, which held formative powers with the Port and each participant in this

context. OEM A could have altered its service contracts to demand resources to be shared. Reflecting on the situation, it was plausible that the participants did not recognise the value of collaboration in sharing their resources. I assumed that the dyadic relationship between the stevedores had created a professional culture against collaboration.

I found that the common rationale of collaboration discussed by Vangen (2017) to be the amalgamation of resources, skills and expertise to yield advantages could not be used to change the culture among stevedores. I considered Vangen's (2017) argument to gain a shared understanding, abolish the problem identification and solution process, and consider conventional change management theories. In this context, I assumed that a common goal could be the initiator for the participants to collaborate. This approach needed to cater to the participants' knowledge, experience, and perceived position in the formative-social-system to create a situation that included change involving all the participants.

To plan for action to confirm my assumption, I evaluated various possibilities for testing the readiness of collaboration between participants. I realised that the suggestion from the stevedores to improve their bargaining possibilities towards their suppliers or customers displayed the traditional view of competitive dynamics. Still, it could also be emotional decision-making based on history. Irrespectively, they all appeared to seek cooperation to accomplish what they could not achieve individually.

The interview of Stevedore B revealed the problematic relationship that had developed due to experience based on earlier collaboration. In the nineties, Denmark exported vast amounts of feta cheese loaded on reefer vessels. These operations required an abundance of dockers, which were not readily available, wherefore stevedore A, B and C formed a company hiring dockers. This collaboration was maintained for several years, and despite the contract often shifting between the stevedores, they all benefitted through the collectively owned company that employed the dockers. Eventually, stevedore A opted to bid with a day labourer from the dockers union and won the contract. The result was that the collectively owned company winded up. Subsequently, all the dockers became organised day labourers, resulting in a strong negotiating position and a critical part of the social setting in Port Esbjerg. This situation indicated that it would be problematic to commence collaboration by sharing resources between these participants. Therefore, their suggestions for collaboration should be seen in context to their relationship built on previous experience.

The history may be summarised with Weick's (1988, p.307.) statement that "an enacted environment is the residuum of changes produced by an enactment". The social structure between the stevedores eroded, trust disappeared, and there was no evidence of the port authority’s active involvement in any crisis management. The result was disjointed incrementalism, where behaviours lead to avoidance of interaction. Each stevedore was muddling through until some

found specialisation in automotive and others in general cargo segments. The emergence of offshore wind introduced a new market segment, and each of the stevedores again competed fiercely.

OEM A took the broader view when advocating that hyper-collaboration could result in cost savings and efficiencies and noted the cruciality of outside intervention to drive the change. OEM A stated that 'hyper-collaboration allows for dynamic production planning and for us that would be considered an interesting possibility to our effect the cost of our production' and revealed a balanced approach to equipment, competencies and standards. Examples were drawn to the hyper-collaboration created to establish the safety training under the Global Wind Organisation and earlier agreement between OEMs on crane specification in pre-assembly operations in ports. OEM A considered the possibility of hyper-collaboration to benefit its own company while acknowledging the benefits of a system that could display availability and enhance collaboration between its suppliers.

The interviews with Port A and Port B differed. Port A was a peer port located in the North Sea and involved in the offshore wind segment, albeit not considered a competitor to Port Esbjerg. Port B was a North Atlantic Port, never engaged in the offshore wind industry. Port A promulgated collaboration between ports, albeit stating that not all ports were ready for such an approach. Asked about Stevedore competition, the fierce competition between these services was also recognised in Port A with a similar belief to me, that engaging new entrants would not benefit the situation. Port A argued that the association of Wind Europe should be the forum for collaboration, while advocating for coalition between the ports. Port B had taken other approaches when seeking collaboration by developing various services needed to increase capabilities. Port A and B, therefore, differed in recognition of the requirement for hyper-collaboration. Port A recognised the need to collaborate, whereas Port B had developed its resources in-house.

I concluded that Port A was in the same position as Port Esbjerg, as they also investigated how to best serve the surging offshore wind market best. At the same time, Port B did not foresee a radical change in their operations. I considered the response from these ports to illustrate the difference in collaboration, driven by the need from an incrementally changed operations environment to the significant shifts in demand to ports servicing the surging offshore wind market. In Port Esbjerg, I perceived the need for collaboration for future activities, which required a common belief in the possibilities that the offshore wind market would create for the participants in this study and the competitive benefits that hyper-collaboration could make.

The planned phenomenon of hyper-collaboration deviated from the conventional buyer-supplier approach displayed among the participants. This approach was observed when OEM A believed it necessary with new entrants to push the stevedores, which argued for a common practice of contractual risk and cohesion towards their standard suppliers. Similarly, the ports' interviews did not give much practical advice, as they suggested collaboration towards demands from regulators, which could not be interlinked to the situation I was seeking to create in Port Esbjerg. I realised that

peer companies only sought collaboration when facing threats. At the same time, it was possible to develop collaborative opportunities that were envisaged to create the dynamics and innovation, allowing for new ways of working together. For example, when Stevedore A argued for uniform safety standards,

During these findings, OEM A contracted Stevedore B when a road accident occurred. However, in due time, the lack of reporting led OEM A to announce that they were looking to contract with Stevedores outside the Port. This approach was critical for collaboration in the formative-social-system, where the relationship among the companies had formed over the years. I understood that ceasing relationships and introducing new stevedores would affect the situation and lead to increased competition and less collaboration. Hence, the action was required to stabilise the problem, and I considered this best done with common goals and arranged for a safety pledge, which then became the first action I created with the participants.

4.2 Action: The 'safety pledge.'

To commence action on the 'safety pledge', the road crossing of the accident was paved with red asphalt and improved signage to alert drivers. Subsequently, the managers from the OEM, stevedores, Port and the dockers met and agreed on the 'safety pledge'. The event was later promulgated with a press release, which was picked up by several newspapers and magazines. This event illustrated that I could use rhetoric to achieve collaboration.

I had believed that joint action would have provided the empirical evidence of how an idea formed by the interview could lead to collaboration. The initial idea was derived during Stevedore A's interview, which argued for the standardisation of safety requirements. Surprisingly, stevedore A elected not to participate, albeit he had promulgated collaboration on safety. The situation displayed unmatched logic in the arguments and actions of Stevedore A. The enactment justified why embedded action research was the selected methodology of participatory action research. This principle was also discussed by Webber and Glynn (2006). They argued that sense-making might be retrospective on the ongoing in an organisational context and discuss what identifies, frames and expectations what is influential in the situation. In context hereto, the situation encompassing the ‘safety pledge’ showed that cognizant constraints might relate to a company and its previous history, while also the inter-personal relationship was crucial.

Nevertheless, at this time, I was unaware of the relationship between OEM A and Stevedore A, which could have explained why Stevedore A did not participate in the ‘safety pledge’. My subsequent questioning of Stevedore A of why they did not participate was explained by them missing the event. Still, as they had confirmed their participation shortly before, I considered this unlikely. I later learned from OEM A that Stevedore A had previously lost a contract with OEM A due to safety issues.

Reflecting on the interviews, this could explain why they argued for standardised contracts and agreed to safety criteria's. Stevedore B had retrieved the contract that Stevedore A had lost; hence their cavalier attitude with the statement concerning hyper-collaboration was 'I think there is a fear of this would lead to increased competitiveness and believe that we are steps ahead of the competition. The interview with OEM A affirmed that the Stevedores needed to collaborate and provide more cost-efficient and safer service through improved operating practices. For me, the question remained if the lack of operating practices and collaboration among stevedores was specific to Port Esbjerg.

I later realised that my approach reverted to the traditional change management theories of creating urgency, coalition, and short-term wins (Kotter, 1995). Conversely, the participants were not part of a hierarchical organisational system. Therefore, collaboration needed to be created in the environment, which Raelin (2010) describe as collectiveness and collaboration progress towards common goals. The situation taught me that I needed to abandon the idea of being able to orchestrate change and pursue to find out how enactment could be created by the participants in their pursuit of collaboration.

The suggestion from Stevedore A in the interview also illustrated how one participant wanted to receive better terms based on the actions of others. This created the dilemma that the suggestion from the participants would inevitably create winners and losers, and collaboration would therefore be problematic. I then found commonality in the interviews by open coding, as I believe this could be used to conceptualise the planning for further interaction.

In this context, my role in the research, the relationship among the participants and the intertwined nature of creating collaboration needed to consider multiple theories when planning another action and review cycle. For example, the planned approaches of Kotter (1995) and Hiatt (2006) require intrinsic leadership in organisations, while in emerging change (Lewin, 1947), participants need to recognise the change. This idea of purposeful change required system thinking and assessment of the environment while considering the companies in the Port as assets and liabilities concerning what I planned to achieve. I, therefore, needed to link situational, strategic and operational change among participants to find an overall consistency towards collaboration. In this context, the theories of Pettigrew and Whip (1992), Donnan (2005), and Checkland (1981, 2000) appeared plausible to my research. Still, in addition to this, I needed to understand the change readiness of the participants.

Consequently, I reviewed the interviews and used the open coding principle to create categories which the participants considered relevant to hyper-collaboration. The coding revealed multiple facets depicting sequential evolution and situational relevance to any intervention. For example, the history of conflict was recalled only by Stevedore B, who was the initiator of that past situation. In contrast, more participants identified earlier successes, while market conditions were acknowledged to be important. I concluded that a common understanding of the situation was

required and accepted that participants also recognised that they were the stakeholders in the change. The competencies of these stakeholders also became a topic in the interviews, while there appeared to be unanimity on the need for the organisation of hyper-collaboration. The overarching themes of worldview, relevance, behaviour, change, competencies, conditions, and leadership were selected in the open coding of the interviews. The detailed coding subjects were relevant to the participants, and I assumed that the subjects repeated most were more likely to develop consensus. The main finding in the coding revealed that, firstly, organising was required. Secondly, the service had to be designed, and the knowledge was to be shared. The coding depicted that participants could benefit from system, and an understanding of hyper-collaboration was required. Finally, participants needed to know how to use such a system.

Conversely, interviews carried different suggestions from the participants on how to achieve hyper-collaboration, and the participants did not broadly accept my initial proposal for sharing resources. Therefore, I needed to evaluate the best initiator for change among the participants, who would appreciate the transformational change required to work together in new ways.

Categories	Noted in the interviews	OEM A	Stevedore A	Stevedore B	Stevedore C	Port A	Port B	Union	Score
World View	Project-based market conditions	1							1
	History of conflict	1							1
	History of success			1		1			2
	History of diverging strategies		1		1	1			3
	Market conditions		1		1	1			3
Relevance	Cost reduction	1	1						2
	Improved efficiency	1		1					2
	Project focus - iron triangle	1			1	1			3
Behaviours	Courage to change		1		1				2
	Egocentric behaviour	1							1
	Rules of engagement		1			1			2
Change	Third-party intervention	1			1				2
	Involving end client					1			1
	Involving other ports								
	Through interest organisations	1				1			2
	Disruption in the supply chain – resulting factors	1					1	1	3
	Organised collaboration	1	1	1	1	1	1	1	7
Agents	Equipment manufactures	1		1					2
	Sub-supplier			1					1
	End-client			1					1
	Stevedores within the Port		1					1	2
	Stevedores outside the Port	1	1	1					3
	Dockers	1		1				1	3
	Port of Esbjerg								0
	Independent party		1						1
	Other ports			1		1	1		3
	Interest organisation					1	1		2

Competencies	Competency of technicians	1						1	2
	Training of dockers	1						1	2
	Multiskilled personnel	1						1	2
Conditions	Health and Safety		1						1
	Contractual Risk		1		1	1			3
	Standard contracts		1		1				2
	Standardisation of operations	1				1			2
	Service design	1			1	1	1		4
Leadership	Leadership	1					1		2
	Transparency	1			1		1		3
	Projection	1							1
	Forum for consensus building		1			1			2
	Commitment				1				1
	Knowledge sharing		1		1	1		1	4

Table 10 Interview Coding

Reflecting on the experience from the other ports, this manifested the perception of the ports' role solely as infrastructure providers and juxtaposed my position as an influencer. Merkel and Sløk-Madsen (2019) recognise this paradox. They argue that ports should be seen as possibilities for growth and have the option to regulate anti-competitive behaviour while concluding that there is little evidence that port law has contributed to the cost-efficient handling of goods. Setting aside the discussion on port legislation, Port B provided empirical evidence of how they had invested in own capabilities. This investment ensured availability when no independent company was willing to make such an investment.

These examples may be argued as sharing economy. The sharing economy was discussed by Apte and Davis (2019), who explicitly say that the transaction cost is preventing the growth of this business model. This business model implies that my pursuit of efficiency to increase port competitiveness should seek new ways of collaboration. In this context, it should be noted that European ports are highly regulated, thus providing the transparency and trust needed to operate such a model. The matter, therefore, remains on the difference between sharing economy and hyper-collaboration and how this differs in creating competitive advantages for ports. The epitome of the sharing model is thus a monopolistic situation used to benefit the community using the resources.

The situation raised the question of relevance. The idea behind peer stevedores sharing resources is that only one company will be contracted to load and discharge a ship. When the different stevedores had similar resources, the utilisation among those losing the contract would be lower, and their profit would be eroded. In context to the offshore wind segment, Stevedore A had revealed that the margin on these contracts was around 4%. Therefore, I had concluded that increased competition would result in three scenarios.

Scenarios	Description of the outcome	Anticipated consequence	Possible solution
1	Less utilisation would result in some stevedores would cease operating in the segments.	The remaining stevedore would achieve a monopolistic situation.	Sharing of resources would lower the cost base for the stevedores
2	Collusion among stevedores to increase the price and then obtain higher margins	Increased stevedore costs would make the Port less competitive	Facilitate the entrance of a new stevedore to the Port
3	Collaborate among the stevedores and others in the Port to attract more activities	Improve utilisation of resources	Create a system that allows for hyper-collaboration

Figure 11 – Scenarios for Decision

The interview questions did not offer a description nor visualisation of hyper-collaboration, and I recognised that the initial action of the suggestion in the interviews, creating a 'safety pledge' could have biased outcomes and affected the supposition of the participants. The various responses could have obscured decision-making among the participants, and this was an instrumental process in understanding the readiness to collaborate in the formative-social-system. Bazerman and Moore (2008) outlined rational decision-making as defining the problem, judging the multiple options, weighting the criteria, generate alternatives, which then are rated before computing the optimal decision. This approach may also be used to identify the various suggestions for collaboration.

Commensurate, I noted that the responses varied according to participants position in the supply chain and their constructed power. The below-detailed suggestions allowed me to evaluate where I could find common goals and how to create the idea for action.

Participants	Suggestion for hyper-collaboration	Party from which action was expected
OEM A	Suggested replicating the uniform standard for safety training and the type of cranes o be used in pre-assembly operations	OEM A stated that it was expected that stevedores created the change
Stevedore A	Stevedore A appreciated that sharing resources could be beneficial but suggested that stevedores agree on safety standards and contractual terms.	Consent from other participants would be required for this approach, but the suggestion would remove formative power from the OEM.
Stevedore B	Stevedore B suggested that a common approach to the lessor of equipment should be pursued by the stevedores to receive better terms. .	Therefore, the suggestion would require collusion among stevedores and agreement on such an approach.
Stevedore C	Stevedore B offered a common approach to obtaining more activities and exemplified their collaboration to enter the offshore wind market in its infancy.	Shared goals for the activities the participants would pursue would be required, and a collaborative network must be established.
Union representative	The Union representative advocated for increased competency and expressed the solution as flexible workers, as experienced with the dockers operating as day labourers.	Increase the competence of dockers and maintain the model where they are only contracted when work is available.

Port A	Port A suggested efforts towards the OEM and advocated that these should be done by collaboration between peer ports.	The collaboration between peer ports requires the involvement of port associations in the various counties and legal evaluation.
Port B	Port A proposed to perform horizontal integration, where the Port gained control by conducting more of the activities performed by the stevedores.	This action would require and different company structure for Port Esbjerg.

Table 12 – Suggestions for Common Goals

The comparison of the scenarios and the suggestion from the participants showed no consensus, wherefore I proceeded to make observations during various events in the formative-social-system. This allowed me to understand if the participants' reactions would correlate with what they advocated in the interviews. I realised that participants in the interviews had stated that they expected other parties to create the hyper-collaboration. Therefore, observations were documented and analysed in context to the event, which could lead to action with the participants. The interaction between the participants was essential to understand if I should achieve consensus.

4.4 Observation: Requesting collaborative opportunities

The observation commenced in a workshop facilitated by a cluster organisation. OEM A, Stevedore A, and B were present. During the workshop, one of the sessions was to identify methods for increasing the efficiency of offshore wind operations within the Port. The competitiveness of the Port was discussed with the participants, and especially the cost of dockers was considered problematic by Stevedore A. Still, no suggestion on solving the issue was aired. Instead, OEM A focused on the many visits the Port receives annually. Stevedore A expressed this as opportunities of which they were being deprived. They envisioned that they could enhance their business by gaining access to visitors, which mainly comprised authorities, investors, and academics that studied how the Port has become the epicentre for offshore wind. I argued that the visits were irrelevant to their business, but OEM A and stevedore A pursued this further.

I marked this observation 'collaborative opportunity'. I appraised it in context to the conventional thinking of the five forces (Porter, 1985), which was also amalgamated into the port ecosystem model. In such a situation, each participant would consider threats to their activities and act accordingly. The increased cost of dockers, as suggested by Stevedore A, confirms the centrality of the dockers in the fuzzy mapping. Logic would have assumed that stevedores in this situation would pursue collusion among stevedores to pursue new collective agreements with the dockers. This leads to my cognition that participants' actions would be based on the perception of threats. If I considered this with deductive reasoning, I assumed that all stevedores would react to threats from the dockers. Provided that this threat was perceived by only stevedore A, other stevedores should also have responded toward the dockers.

Praxis, however, dictated that such deductive reasoning was not used, as Stevedore A did not gain consensus towards the dockers. In this situation, the stevedores had a different perception of the risk. Therefore, I assumed that the

behaviour of the stevedore depended on their possibilities concerning their position and power in the formative social setting. This was also found in the interviews that depicted how the history between the stevedores had influenced their view of their capabilities. This was observed when stevedore B considered its service superior to stevedore A and abolished sharing resources. On the contrary, stevedore A has not pursued actions to eliminate stevedore B, though lowering prices, acquisitions, or mergers, wherefore some form of anecdotal generalisation could be considered. I, therefore, pursued inductive reasoning, where data, generalisation and observation may lead to the conclusion on the power structure between stevedores.

I considered the arguments for involvement in the visits to the Port to portray opportunities for OEM A and stevedore A and hence be the reason for the request. In this case, I reversed the principle of the five forces model to consider opportunities, which theoretically should result in a similar action pattern. Reverting to the workshop's outcome, it was clear that the rivalry among the companies led to disagreements. Debatably, the perception of opportunity also created commonality between OEM A and stevedore A and manifested their view. Reflecting on this phenomenon, I considered the premise to find a situation where enactment from the port authority could be effectuated, as this would validate the Port as the gatekeeper.

I conducted this sense-making for action by conjoining the elements found in the coding with the the contemporary environment described in the observation evaluated how this affected the decision-making. This situation was found concerning several safety incidents, initially involving OEM A and stevedore A and later also stevedore B. OEM A had informed me that a safety incident led to nullifying agreements with stevedore A. Stevedore B had then been contracted for the work, but this also resulted in OEM A to pursue bringing in stevedores from outside the port ecosystem, as OEM A believed this would increase competition. The pattern of suggestion advocated during the interview with OEM A was evident in the action pursued, but I thought I had inadvertently used this situation to create action. This action was performed by increasing safety awareness and inviting OEMs, stevedores and dockers to participate in the 'safety pledge'. The focus from OEM A on safety was so strong that it resulted in collaboration with Stevedore B, and the situation taught me that hyper-collaboration could be organised.

Initially, I believed that the interviews were the participants' viewpoint, without bearing in mind that their responses could have been influenced by the content of the questions, their previous knowledge and history with the other participants, and their relationship. I had not yet realised that responses were contemporary and dependent on the situation. The interviews displayed the expected influence based on the participants' knowledge of the position relative to the other participants and the history of earlier collaboration. This history made me aware of my role, representing the port authority. The participants may have decided to relay the request only to imagine the outcome to make a difference in their situation. The safety pledge was an example that could have illustrated why stevedore A

had argued for uniform safety standards. Still, I also learned that it was possible to create a situation that benefitted the relationship between OEM A and Stevedore B and display that new forms of collaboration could be achieved.

There were three various approaches displayed in the interviews. The first was the static supply chain approach, where the outcome is dictated by the person with the formative power, who expects the other party to create the change. Exemplified, OEM A expected cost savings and efficiency gains and anticipated that stevedores obtained this through hyper-collaboration. The second approach was the historical canonical knowledge that prevented repetition and problematised alternatives. This history was observed by stevedore B when noting that they had enquired about collaboration earlier, and the other Stevedores declined. Finally, the interviews displayed that the participants recognized their limitations when they advocated that other parties should create the desired outcome.

In essence, the interviews exposed the issue that had led to my quest for hyper-collaboration. OEM A stated the demand for stevedores to be more competitive, but they could not collaborate. They also understood that they could not change the situation without this coordination. To develop action, I believed that the best method for creating buy-in from participants needed to consider the order of the intervention. I assumed that consensus was dependent on the acceptance of most of the participants and reverted to evaluating the interviews. The coding revealed that organised collaboration, service design and knowledge sharing were pivotal in the interviews. I later realised that my consensus-seeking approach to pursuing common grounds made me assume that one successful intervention would lead to the next. This agreement eventually would manifest new ways of working together.

I, therefore, planned action, where knowledge could be transferred under a common goal and thereby achieve commitment to the change. Such dedication was based on the requirement to curb carbon emissions from ships in the Port. This required investments in systems for connecting the ships to shore power, thus avoiding using diesel engines while in port. Companies had to instruct the ships to use this system during port stays, as the port authority cannot regulate this.

4.5 Action: The Carbon Pledge

To plan for the joint action, I invited companies to workshops conducted visually by an external facilitator. The belief that coherence among participants could be achieved from the plausible argument of greener operations and exiting technologies using shore power system, promulgated with a subject matter expert. Aiding the decision to use an external facilitator was the coding of the interviews, where my rational was that knowledge had to be shared and systematized to enhance collaboration. Hence, selecting a knowledgeable person for the subject of carbon reduction would require an external facilitator.

The companies were divided several groups, of which one was stevedore A, B and C. All the companies shared the world view to entering the path towards carbon neutrality. This was not followed by action, as none of the companies took any steps to enter a formal agreement with the port authority and commit to using shore power systems.

During earlier conversations with the facilitator, I noticed the complex language she was using and the prolonged sentences and had my worry about the online setting. An example was given in her argument that Port Esbjerg should collect and share data with all actors within the port, allowing for mass optimisation of workflow and energy use (decarbonisation management), leading to cost savings and lower greenhouse gas emissions. And the statement that 'within the overall process we see more individual tracks: business design, service design, EMS system/digital infrastructure, and a vision for continuous collaboration'.

This displayed a discrepancy between the pressure for greener operations that stevedores would expect from their customers to the practicality of finding ways to incorporate this into their respective business solutions. There would be the risk of participants not discussing openly due to the language barrier, especially when using complex technical language. The participants must have had similar considerations, as they asked about her background in one of the workshops. I realised that could have affected the participants' response, openness, and knowledge sharing.

On the contrary, the outcome was that the facilitator delivered the visualisation of the transition towards carbon reduction. I also observed that participants' commitment was problematised because the group was somewhat unfamiliar with participation in virtual workshops. This could seem contrary to Oghbaie et al. (2016) argument that interactive visual systems for visualisation in complex systems augment causal reasoning and decision making. Still, the expected outcome of uniform commitment given by one group quickly emerged. I found that the proposal did not convince the group of stevedores.

The visualisation and method of communication were unfamiliar to the participants, but the ongoing pandemic dictated this method. Oghbaie et al. (2016) argued for visualisation to establish a cleaner relationship between complexity, ambiguity and efficacy in decision making. Still, my observation during the workshops was that the reaction from the stevedores resulted in adverse behaviours and progress was halted. Consequently, the commitment to the cause remained verbally, wherefore, a 'carbon pledge' was proposed to ensure commitment from the participants.

Therefore, to progress, I considered the buyer-supplier power structures, where several stevedores held contracts with participants in another group. I proposed a 'carbon pledge' to initiate action. In this, the companies agreed to confer, discuss, cooperate, and exchange information and best practices related to subjects aimed at but not

necessarily limited to environmental issues, focusing on reducing CO2 emissions at and around Port Esbjerg. In this context, the companies were required to:

- Continue to implement efforts to reduce their carbon footprint
- Promulgate carbon reductions in pursuit of both environmental and cost objectives
- Collaborate on communicating our carbon-reducing activities
- Use and act on information available in Port Esbjerg's Carbon and Energy Management System
- Share information on energy consumption when this benefits carbon reduction measures
- Continue to implement adequate measurement of energy and fuel consumption.

In the 'carbon pledge', the companies also committed to building and maintaining close partnerships to form an integral part of our approach in all these areas. This declaration acknowledged that each company would prioritise initiatives and actions differently based on environmental, social, and economic realities.

Therefore, the 'carbon pledge' catered for the findings in the coding of interviews. It organised the collaboration through inclusion in the Carbon and Energy Management System and shared knowledge on carbon emission to benefit all the companies. On the contrary, the 'carbon pledge' failed to explain the benefit to participants. I did not appreciate that the methodology interfered with the strategic intention of some of the participants. For example, stevedore A stated that they would not consider any investments without sound business cases, and stevedore B argued that they already were computing their carbon footprint. I noticed during the workshop that stevedore A was following stevedore B. This became evident when they were asked to share information on their carbon emissions, and stevedore A asked stevedore B if they would accept the request. I reiterated that sharing information was a precursor to making the function of the carbon management system and thereby gained their acceptance.

I considered relationships among the participants and planned to gain acceptance from those with the highest formative power. The group were customers of both Stevedore A and B, and I, therefore, requested them to endorse the carbon pledge. Hereafter, the stevedores agreed to the carbon pledge, which demonstrated the strong effects of the supply.

Based on these observations, I understood that the common worldview did not necessarily result in knowledge sharing or structured collaboration, and influencers could imply social or formative powers. Lewin (1947) recognised the phenomena and explained them as gatekeepers that could influence beyond their formal position, while Bazerman and Moore (2008) took the approach that numerous biases affected the individual. I observed that stevedore B could be considered a gatekeeper with stevedore A, or both depicted bounded rationality and recognised my position in the situation.

Irrespective of the causes, I realised that the participants' decision was based on their understanding of the concurrent situation. This drove me to observe the participants in various situations, as I assumed their behaviour could be different from the intentions relayed in the interviews. I became cognizant of the potential difference in the interview, the purpose hereof, and the participants' actions. Therefore, I considered observations relevant, as I believed that such observations would inform me of participants' behaviours in various situations and provide the empirical evidence needed to design the next idea for action.

The interview revealed the intention of participants to enact, while in-situ situations comparison actions and observations identified their capability to act. In this context, it may be argued that the symbiosis of the situation and participants determines how action can be effectuated and this I observed in a situation where participants had to react to risk.

4.6 Observation: Dockers Blocking a Ship

Another example of how relationships are intertwined with trust was considered in the observation describing dockers blocking a vessel. The dockers are integral to Port operations, as also justified by the high centrality of the unions in the fuzzy mapping. The issue involved Stevedore B, which derived from the shipowner not being a member of the International Transport Workers Federation. The result was that the dockers blocked the ship from departing for two days.

The involvement of police or letters of lawsuits from the ship owner to the dockers and their unions made no difference. Still, these causal factors resulted in frictions between dockers and Stevedore B. I was involved in the process as the port authority, but despite multiple calls and discussions with the dockers, I could not progress. Finally, in one meeting, where the dockers and the union representative, Stevedore B and I participated, the formative powers of the dockers became very clear. The tensions were high, and the dockers told Stevedore B not to interfere. There is no employer-employee relationship between Stevedore B and dockers, as the dockers are day labourers. Instead, the dockers are controlled by an elected foreman, who liaises closely with the local union representative participating in this research-.

Eventually, the owner of Stevedore B had to approach the union representative for the docker. The owner of Stevedore B held high formative power due to the history. The observation illustrated how sudden change in the formative-social-system can result in mistrust and how this destroys collaborations. I found similarities in the history of the collective-owned company involving Stevedore A, B and C, where it had been the same owner of Stevedore B who had taken action that seized collaboration.

The incident with the blocked ship also affected trust, as observed with anxiety displayed by Stevedore C even though they were not involved in the issue. I was called by stevedore C, who asked if they could plan their next operation given the recent situation between the dockers and stevedore B. This provided an example of how one issue can lead to another, and ripples of uncertainty affect the participants. I understood that the formative power of the dockers questioned the bounded rationality among the stevedores in this situation when they did not concur with the response to the problem. The learning was that in collaboration towards issues, the participants must agree with the origin of the issue.

For these wicked problems, the advice of Churchman (1967) was to resolve the issue by carving off the problem or taming the situation. However, the situation with the blocked ship prevented such an approach, as the formal relationship between stevedore B and dockers did not allow one party to dictate the response of the other. For the participants in this study, this could also be typified during the loadout of wind turbines. The situation observed with stevedore B and the dockers showed the capability of individual actors to affect a situation where operability typically was based on consensus.

My initial observation portrayed a systemic mess that displayed how the participants reacted to various situations, which often contradicted the myopia of rational sense-making. The formal power was decisive, and if agreements were broken, the relationships immediately became disjointed, as observed when Stevedore A did not participate in the Safety Pledge. The trust among the participants was pivotal in collaboration, as observed with the disjointed relationship between when dockers blocked the ship. The rationale would be that formal relationships must be developed and trust gained to achieve collaboration. I understood that this conclusion could be haphazard to the desired action. The difference between collaboration and hyper-collaboration is that the as-is situation is improved, whereas the latter creates a new situation. I, therefore, proceeded to develop action where an agreement was obtained.

4.7 Action: The Joint Declaration

This action can be described as the joint declaration involving multiple companies operating within the offshore wind industry. The participants agreed to ensure the workforce and its supply for Denmark's green transition through sharing information and knowledge and supporting the recruitment and training. I developed the idea for the joint declaration with the participant representing the dockers union. This allowed me to observe how the participant with the highest centrality, as identified in the fuzzy mapping, could affect the other participants in a situation not presenting risk, opportunity, or a concurrent problem.

In the joint declaration, participants agreed to collaborate to recruit the workforce for the green transition and enhance the competencies of these employees. In addition, they decided to share their knowledge and ideas for

selecting the workforce considering synergies between various industries. All participants in this research accepted the joint declaration, and many unions, schools and companies working within the offshore wind cluster represented within the Port. Every participant asked to participate became a signatory to the declaration. This demonstrated how change could be initiated with a common goal and worldview with due consideration to the centrality of the initiator.

4.8 Discussing the actions and observations

Commensurate, the actions and observations revealed differences related collaboration and similar rhetoric and relevance were found when the subject related to future possibilities. I did not find any evidence that this enhanced the relationship of trust among the participants. Participation agreement was evident when the issue could be considered an opportunity. I, therefore, had to examine the rationale of each of the participants. The actions comprised situations where the participants interacted, and their behaviours and actions could be considered, as:

- The 'safety pledge' situation illustrated how rhetoric could be used to obtain agreement and how formal social relationships may prevent collaboration.
- The 'collaborative opportunities' portrayed demand for participation visits to the port authority illustrated how emerging change became relevant to the situation.
- The 'carbon pledge' showed how a lack of trust with the facilitator could problematise the situation and how social-formative power could overcome the issue and collaborate.
- The dockers blocking a ship taught me how influences from outside the contagnions of the formative-social-system can led to immediate change in behaviours and trust, but also how entrenched power relationships can be used to regain stability
- The joint declaration confirmed that causes, which carry no risk and requires minimal commitments, but can be seen as noble, gains high commitment.

The actions and observation taught me that reactions from participants could be achieved with six different heuristics. I reviewed the commonalities in the actions and observations. I found that rhetoric around the objective, the subject's relevance, the relationship among participants, trust among the participants or the facilitator and the social-formative power were pivotal in obtaining action. Contrary, the coding of the interviews revealed that most participants agreed to the organised collaboration, service design and knowledge sharing.

Issue/Actions and observations	Safety Pledge	Collaborative Opportunities	Carbon Pledge	Blockage of Ship	Joint Declaration
The rhetoric around the objective contained ethos, pathos or logos	1	1	1	0	1
The relevance of the subject was persistent	0	1	1	0	1
There was a former history among participants	1	1	0	0	0
Trust among participants was gained during the event	0	1	1	0	0
Trust in the facilitator was influential in the outcome	1	1	1	0	0
Social-formative power affected the outcome	1	1	1	1	1
Score	4	6	5	1	3

Table 13 Actions and Observations

4.9 Reflecting on the empirical evidence

The interviews could be argued to be the participants' viewpoint, and the coding identified that participants required structure to approach the idea of hyper-collaboration. The coding also identified similarities that could be used to conceptualise how to engage and interact with the participants. The open coding principle pivoted around the themes of worldview, relevance, behaviour, change, competencies, conditions, and leadership. The interviews also revealed that participants would tell their stories based on experience and promulgate their future involvement based on what could enhance their situation. In this context, I assumed that themes with the highest consensus would have the best likelihood of acceptance among the participants. Knowledge sharing, service design and organised collaboration declared the highest score, wherefore the first action of the 'safety pledge' evolved around organised collaboration.

The interviews also displayed an expected influence based on the knowledge of the position in the formative-social-system. Coupled with the history of earlier collaboration, it revealed multiple facets depicting both sequential evolution and situational relevance. Commensurate, I found three various approaches displayed in the interviews.

- The first approach was the static buyer-supplier approach, where the participant with the highest buying power expected the other participants to collaborate.
- The second approach was canonical knowledge gained from the history of interactions between participants. This history prevented repetition of earlier failed collaborations, wherefore participants encouraged various alternatives.
- The third approach displayed participants recognition of their limitations when they promoted that others should assist in creating the desired outcome.

I considered the multifaceted approaches proposed in the interviews in context to the decision-making capability of the participants, and here agreement existed on the inclusion of all participants in a structured approach. To develop the initial change, the best method for consensus needed to consider the order of the intervention. Therefore, action and observation were deemed relevant in understanding participants' behaviours in various situations.

The formative powers were evident when OEM A believed it necessary with new entrants to push the stevedores. This argument illustrated that OEM A and stevedores operated within the buyer-supplier situation. At the same time, the peer ports took a broader perspective, included the operating environments, and suggested a collaboration on demands arising from regulators. The situation represented the paradox that each participant wanted to receive better terms based on actions from others, thus inevitably creating gains and losses when jockeying for a position in the port ecosystem.

The heuristics found in the observations showed that collaboration depended on the justification for enactment, and this needed to be situational and relevant to the vexing issue. There was an analogy with parts of the coding, but the

empirical evidence also found that participants could react contrary to the normative behaviours displayed in the interviews. I realised it would be the ability to read the situation in conjunction with the desired outcome and the powers among the participants that would progress this research. Participants needed enactment to evaluate how hyper-collaboration could be achieved and thus derive the framework.

I considered interviews merely to propose various elements and practices for collaboration. In this context, some participants advocated for the involvement of third parties. In contrast, other participants referred to companies within the same network, but none of the participants offered to take the leadership role. I argue that the emphasis on my role as the initiator, representing the port authority, in the social-formative-system was depicted in the fuzzy mapping. My learnings moved towards the three dilemmas in action research described by Rapoport (1970), recollected as ethics, involvement and initiatives.

The ethic was regulated through the formal relationship with participants. The normative justification of a framework for hyper-collaboration was not derived from a contemporary issue but identified by me, as CEO of the Port, to be relevant for the competitiveness of Port Esbjerg. This strategic direction also portrays the conundrum of change in the social-formative system, even when the need for change is not apparent and imminent. The ‘safety pledge’ actions taught me that consensus is easier to achieve in a contemporary situation when the issue is evident and presents some form of opportunity. On the contrary, hyper-collaboration should result in an enduring change in social-formative-systems, which requires a change in behaviours. The participants' awareness of this was displayed in the coding of the interviews, where systematisation, content in the form of service and knowledge, was the overarching themes. Reflecting on this learning, I concluded that participants recognised the value of hyper-collaboration but required me to instigate the framework that could lead to such a phenomenon.

Arriving at this conclusion, I noted that OEM A had shown leadership relevant to the formal position in the port ecosystem as the end client. Stevedore B was aware of their connections to the other participants, as well as their role, while dockers had displayed their powers. The information and sensemaking below show how I was able to create urgency using the data from the interview of OEM A to gain a similar world view of stevedore B and, by this ensure commitment.

Information: I called stevedore B and reiterated the issue that OEM A was looking at contracting with an outside stevedoring company.

Sensemaking: I was trying to achieve the same worldview and find commonalities.

Information: Stevedore A agreed to the concern, and I mentioned that the category manager from OEM A was changing to one person who would continuously pursue the lowest-cost bidder. Stevedore A was aware of the person.

Sensemaking: Stevedore A understood that it was a mutual effort to achieve a good impression of the Port and stevedores, as a new entrant may cause a problem. It was not the concern of the potential new entrance but the issues the lack of experience could cause in the Port concerning the dockers.

Result: A meeting must be held to make a transparent strategic approach to this new situation, driven by a new category manager, including stevedoring B working for OEM A.

This enactment was used to create buy-in from OEM A and Stevedore B by first facilitating meetings with Stevedore B to discuss the opportunity for pre-assembly sites for the offshore wind. Simultaneously, I informed OEM A of the meeting with stevedore B. I requested that they give their guidance on the subject. I then relayed their responses to stevedore B and thereby constructed a situation where I managed to enact OEM A and Stevedore B and achieved consensus between myself, OEM A and stevedore B.

However, through interaction and my formal relationship with the participants, I pursued the normative justification of my involvement and affirmed the social-formative-system. I, therefore, decided to evaluate my role in the actions and observations. The interview with Stevedore A influenced me to plan the intervention without reflecting on the origin of stevedore A's arguments. The contemporary settings were derived from an issue that justified action. In this action, participants occurred undependable of each other and me, and formative powers were nonexistent. Stevedore A performed acts that appeared unjustified or irrational until I became aware of the disjointed relationship between OEM A and Stevedore A. I concluded that no generalisation could be made, and intervention may only be made known in action.

Therefore, the action demonstrated that collaboration was achievable in the forward-looking phase. In contrast, the stage related to contemporary issues requires that I consider both formal and informal relationships. Isabella (1990) discussed evolving interpretations as change unfolded and argued that coding should include common concerns, similar details, observations, perceptions, predictions, and recollections. My conceptualisation of the situations affected construed reality. I performed this by the resemblance between reflection and my role in the action. I then considered this with the success of implementing collaborative measures. Finally, I selected the actions with most participants involved and where I had been central to the change. I believed this would reveal the practice of creating enactment.

The action describing the ‘joint declaration’ involved most formally and informally connected participants. The common goal was forward-looking, and participation presented an opportunity with limited commitment. Contrary, I argued that the action leading to the ‘safety pledge’ derived from recent events and involved participants all connected formally. My centrality in the social-formative-system did not displace the disjointed relationship between OEM A and Stevedore A. Instead, I concluded that enactment had to be built on situations that were relevant to the participants

and where they could benefit from the involvement. I noted that the change needed to be justified for the enactment, and commitment had to be displayed.

Then, I considered the number of formal and informal connections in each of the situations and concluded that the result of the enactment was a plausible parameter for measuring the successful outcome of any action involving the participants. This questioned my earlier conclusion that consensus was needed for collaboration to take place. The 'carbon pledge' illustrated that despite barriers in relationships, collaboration could be achieved by considering formative power.

In the numerous actions and observations, I noted that acknowledging collaboration was easier to achieve when it did not entail commitments. The 'joint declaration' was swift to obtain compared to than the 'carbon pledge' that required monetary commitment. Demand from OEM A and stevedore A for participating in port visits displayed commitment when their perception was that this was an opportunity. I then realised that opportunity and commitment appeared to be one denominator for enactment, but I needed to understand if commitment could also be considered a threat. I tested this with deductive reasoning. I argue that deductive reasoning can be evaluated for reactions based on how participants could act on perceived threats and would react to identified threats. This situation would result in all participants in any collaborative setting responding to treats. Their reactions would then be derived from their interests, which could depart from the one collectively advocated, thus problematising enactment. I found the difference in the responses to threats was observed to be situational and did not relate to earlier expressed intentions among the participants, wherefore, the alternative option of inductive reasoning was evaluated. The same rivalry among the participants was assumed, but it was the perception of the possibility that collaboration could create which led to acceptance and enactment.

Generalisation and observations lead to my conclusion that participant behaviour could be explained with a similar worldview, while acceptance was reliant on social powers. This situation could also be defined as the trustor social-formative power of the facilitator and the participant's acknowledgement of the subject's relevance. This theory of influence suggested that initiating the change in the formative-social-system depended on power relationships. In certain events, the participants were more likely to engage in collaboration. My inquiries needed to identify which factors would enact the participants and develop a precursor for hyper-collaboration that could be tested. Such a test would support developing the framework but also examine the practicability in creating hyper-collaboration among the participants.

The first enabled action was derived during an interview with stevedore A and the argument for safety criteria. The rationale was later revealed in the relationship between OEM A and stevedore A, who may have a covert agenda during the interview. This action, therefore, questions if the suggestion for safety criteria from stevedore A was related

to risk to own contractual position. Furthermore, the situation illustrated a wicked problem, which Rittel and Webber (1973) argue is a symptom of another problem. This situation problematised the use of research cycles in context to wicked problems, as such are unique, and learnings from one wicked problem may not be transferred to the next. Situations involving both risk and opportunity for the participants were thus identified.

The formative-social-system was jeopardised when OEM A had cancelled the contract with Stevedore A and subsequently had contracted with Stevedore B. Thus, the participants could view the 'safety pledge' as successful, but Stevedore A was not involved due to the above event, which could affect collaboration. The situation showed the capability of individual participants to affect the system. Still, I argue that collaboration should be used to solve issues in systems where operability is based on consensus. On the contrary, when the relationships are based on formality from contractual relationships, termination breaks the bond needed for collaboration. Therefore, I considered it imperative that participants collectively embrace possibilities.

My reflection on the formative-social-system portrayed two directions, comprising forward-looking and contemporary settings. The forward-looking collaboration on opportunity or commitment to a cause is based on specific perspectives and consensus in these settings. The current settings were derived from an issue where interference from others occurred, and these were undependable of the function of the formative-social-system. In these cases, the actions appeared unjustified or irrational to participants.

The actions demonstrated that collaboration was only achievable in the forward-looking phase. I had navigated between formal and informal relationships. On this basis, I found it hard to generalise and conclude that intervention had only been made knowing in action and my personal experience being impeded in the settings needed to be considered. Isabella (1990) discusses evolving interpretations as change unfolds and argues that coding should include common concerns, similar details, observations, perceptions, predictions, and recollections. Therefore, my conceptualisation of the situations was essential to understanding the construed reality. The actions and observations were coded with my role, ranging from no involvement to being involved in the commencement of the situation or being directly responsible for the intervention.

Own responsibility in the event	Safety Pledge	Collaborative Opportunities	Carbon Pledge	Blockage of Ship	Joint Declaration
No involvement in the event	0	1	0	1	0
I was the initiator of the event	1	0	1	0	1
I was directly responsible for the outcome	1	1	1	0	0
Score	2	2	2	1	1

Table 14 – Own responsibility in the actions and observations

I considered the resemblances between the actions and my involvement important for creating the precursor for hyper-collaboration. However, this had to be seen in context to how I had defined hyper-collaboration as 'collaboration without coordination. Reviewing my observation of the various events, I noted that I had been involved in nearly all of these. Moreover, in three of the events, I had also been the initiator of the situation. Finally, I had also been directly responsible for the action in three events, albeit they portray very different origins and outcomes.

To create a system that initiated 'collaboration without coordination,' I assumed that intervention needed to be accepted by each of the participants. Therefore, rhetoric was imperative to understand, as this could justify participants' enactment. I needed to develop a system which could provide the service description and conduct the knowledge sharing that I found Important when coding the interviews. The system should also be able to influence the participants to collaborate without my involvement. I considered a forward-looking approach that depicted opportunities that would create acceptance. In contrast to one dealing with formal relationships, recent history and relevance were persuasive in the participants' commitment.

Further, the system should create the perception of desired change among the participants. The situation describing the ‘joint declaration’ and the collaboration on opportunities involved most participants in the formative-social-system. These situations carried a common forward-looking goal. Contrary, the ‘safety pledge’ and ‘carbon pledge’ demonstrated that successful implementation depended on the justification for enactment, which needed to be situational and relevant. These events displayed some form of urgency due to concurrent situations derived from recent experiences and involved formal connections. To develop a system for hyper-collaboration, I evaluated how to use empirical evidence to establish the idea for hyper-collaboration.

4.10 The idea generation, developing the precursor for hyper-collaboration

I initially manifested my role as directing the desired action but also observed that consensus had been easier to achieve in a contemporary situation with an obvious issue. Conversely, enduring change in the social-formative system must be cultural, requiring a shift in knowledge and behaviours. The participants' awareness of the desired change was derived from the coding. Here, organised collaboration, system design, and knowledge shared were the denominators, but few suggestions on a way forward was given by the participants.

To solve this dilemma, I pursued sensemaking by considering Weick's (1988, p. 305) statement “sensemaking in crisis conditions is made more difficult because action that is instrumental to understanding the crisis often intensifies the crisis. This dilemma is interpreted from the perspective that people enact the environments which constrain them”, while arguing the importance of situational commitment, capacity and expectations. This principle was used to create commitment by first facilitating meetings with the most influential actors, OEM A and Stevedore B, to discuss the future port operations for the offshore wind activities and my intentions for the port strategy. The series of meetings

with the participants and discussion on future infrastructure projects was the plan. The sessions did, therefore, not directly discuss hyper-collaboration but were used to manifest my role as the organiser for change.

In sum, I anticipated that the best intervention outcome could be obtained using data for common goal setting and ensuring that relationships were conjoined while acting with transparency and accepting formative power among the participants. The idea was to build a system that would be the precursor for hyper-collaboration and require some form of commitment while allowing for systematised collaboration. Reflecting on the interviews, I believed it relevant for the participants to showcase their services.

The intention and capability of participants were therefore evaluated in context to events that would result in their commitment. To identify such a point in time, I used retrospective observations, knowing both the participants and the situation through coding a interview, observations and involvement were performed. The analysis of the field observation generally dictated that the importance and commitment of participants in the situation relate to two risk categories. The forward-looking situation presenting an opportunity gained high commitment, while an impending situation presenting a threat gained less commitment. My findings suggested that a forward-looking situation gained the best commitment.

Commitment from all the participants who were intended to be involved in the situation	A forward-looking situation presents an opportunity	Impending situation presenting a threat
Safety Pledge	The situation presented an opportunity for Stevedore B to repair the relationship with OEM A	
Collaborative Opportunities	The situation presented an opportunity for all the participants involved and required no commitments to change their operations, which carried a cost element.	
Carbon Pledge	The situation presented an opportunity for all the participants involved but also required a commitment to alter their operations using the shore-power systems for the ships, which required a cost element.	
Blockage of Ship		The situation threatened Stevedore B and the dockers, who risked their relationship with the stevedores and the shipowner.
Joint Declaration	The situation presented an opportunity for all the participants and required no commitments to change their operations or carry a cost element.	

Table 15 – Retroperspective Observation

The first option was to use the formal powers and contractual authority between the participants or those with the highest bargaining power to gain commitment. OEM A could change their contracts with Stevedores and require them to share their resources, but I could not dictate this approach. The second option was to use the participants with the highest centrality identified in the fuzzy mapping to create the change. Conversely, the definition of creating 'Collaboration without Coordination' defeated the purpose of using decisive influence in obtaining commitment

among participants for new ways of working together. The third option was to create a system where each participant knew their role in the social-formative system and thereby provided the outset for collaboration.

In context to hyper-collaboration, the situation with the dickers blocking a ship, displayed that if participants are part of a community, they may act based on the unified expectations in this community. The dockers' cognition of the situation led to their action based on their knowledge of the requirements from the International Transport Workers Federation and their membership hereof. Commensurate situations related to a community and decision on participation are a response to cognition of the social-formative system in which one enacts.

To identify these situations, I considered the anticipated reaction from the participants while recognising that such assessment may be biased by past events, present situations, and the stiffness of the community. The relationships between the OEM A, stevedore, and dockers were fluent and depended on situations. My actions showed cognitive constraints of sensemaking of the individual participant, while they appeared to be influenced by the formative-social-system in which they interacted. The situation where OEM A, stevedore A and B demanded part of the visits demonstrated how they saw themselves as part of the activities of the Port. Identifying how commitment could be achieved thus required transparency in the form of information and knowledge sharing, as this allowed agreement on the predictability, opportunity, perceived threat and importance.

The ‘joint declaration’ exemplified the situation, where consensus was achieved on the common goal. The commitment to the ‘joint declaration’ confirmed the perception of the situation and the belief in a common approach to an issue that may benefit the individual and the whole formative-social-system. The situation allowed my first proposition stating that 'commitment may be achieved with uniform perception'.

The contrary situation was observed in the event where the dockers blocked a cargo vessel. The action was unpredictable, and the behaviour created stiffness of perception in the formative-social-system. The observation validated the centrality of the dockers in the formative-social-system but also displayed how the action of one actor can affect the perceptions overall. The situation allowed for my second proposition that the 'unpredictability impedes action'.

The ‘collaborative opportunities’ could, therefore, best be described by the situation, where the Port was perceived to have access to new business opportunities, and non-attendance was perceived to deprive participants of opportunities. The information on the visits to the Port has created a situation where participants had requested involvement. Still, my requirement for them to describe their services had led the participants to describe their activities in the offshore wind industry. Their approach appeared to be assumed to be consensus-seeking, and I was perceived to be the gatekeeper for the opportunities. This embodies the relationship in the formative-social-system,

where all relevant participants need to be involved for each participant to gain more. The situation allows for my third proposition that 'agreed opportunity will lead to action', while my fourth proposition was that 'the gatekeeper needs acceptance to progress'.

The importance of the situation about the engagement was observed with the ‘safety pledge’, only one stevedore felt obliged to participate. This situation allows for my fifth proposition that 'participation is dependent on acceptance from the social-formative system'. From an epistemological view, I found that the propositions made from the empirical evidence needed to be justified, I, therefore, consider abductive reasoning to combine the premises and test the plausibility of the idea of the precursor for hyper-collaboration. To consider abductive reasoning, I prepared several propositions found during the actions and field observation.

Proposition Number	Proposition Statement	Premises for Action	Plausible Solution
1	The commitment may be achieved with uniform perception	The participants hold the acquired knowledge to derive from the perception	The sharing of information between the participants is required
2	Unpredictability impedes action	The reason for a situation must be known and accepted by the participants	A collective goal should be agreed upon and accepted by the participants
3	Agreed opportunity will lead to action	The participants must see commitments as an opportunity	, which requires a similar worldview but can also be achieved by creating a situation where each participant has to accept an opportunity to participate
4	The gatekeepers need acceptance to progress	The gatekeeper is considered the same from the view of all the participants	Ensure that the importance of the gatekeeper is limited, but systematising the collaboration
5	Participation is dependent on acceptance from the social-formative system.	The participants must consider themselves as part of the social-formative system.	The social-formative system is formalised.

Table 16 – Propositions for abductive reasoning

I concluded that the formative-social-system needed to be formalised, and there had to be a system that allowed each participant to recognise their position with the others. I believed this would enable them to share the knowledge needed for collaboration to exist. Further, this postulated that participation depended on the community's acceptance. Hence gatekeepers must be part of the community. Finally, this premise allows for the syllogism for the statements:

- Major: gatekeepers are part of the community
- Minor: enactment in the port ecosystem requires a community among the actors
- Conclusion: enactment requires gatekeepers in the community

Having determined that I could be the gatekeeper, I needed to understand how a community could be created. I realised that information exchange must occur to create a community, and each participant would be required to acknowledge their position in the community. For hyper-collaboration to exist, the participants must work together in

new ways, and therefore, community members must interact according to their capabilities. This leads to the theory of meritocracy, which according to Kim and Choi (2017), develop the 'equality of opportunity while stating that 'the concept of merit may vary according to the context and culture'. For the participants to deliver their services, they would need to act with transparency on merits.

Still, when engaging with the participants, it became evident that their perceptions of the opportunities in several cases were beyond their capabilities. Toward the end of the first meeting, where OEM A and Stevedore A had required their attendance during the visits to the Port, I had a phone call with OEM A to discuss the demand of Stevedore A. I reiterated that the requirement to engage with visitors had to be seen in contexts to the capability of the companies. I argued that if a visitor from an emerging market requested Stevedore A to establish their service in another port, this would not be possible as they already lacked resources. OEM A acknowledged the situation but suggested that the port authority actively share the knowledge of offshore wind operations with other ports authorities.

The interviews depicted participants who understood collaboration was essential, and most participants agreed that organised collaboration, service design, and knowledge sharing were essential parameters in developing hyper collaboration. My idea of sharing equipment gained no foot-hold. Still, when examining the responses, I found three scenarios and realised that to improve the utilisation of such resources, I had to instigate collaboration among the participants. This required the participants to view these possibilities through the same lens I did. In essence, we needed to share the same worldview. The surge in offshore wind should gain interest from all companies working within this industry.

To create a similar worldview, I could decide to argue that collaboration would increase competitiveness and continue to inform about market possibilities. Still, I needed to systematise how participants could interact. At this point, my idea was analogical to parts of the interviews. Still, empirical evidence also suggested that participants could react contrary to what they had promulgated during the interview. This made interventions for change challenging to plan. I understood that my ability to read the contemporary situation in the formative-social-system should be used to enable action that could lead to the desired collaboration.

The first action with the ‘safety pledge’ taught me that even if participation in the event appeared logical and the rhetoric was plausible, the commitment would disappear if the relationship was distorted. The ‘carbon pledge’ informed me of the importance of the facilitator and illustrated how formal powers between the participants could affect the outcome of an action. I learned that urgency and worldview were essential factors. However, during the interviews, I also noted that none of the participants was offering to take a directing role in creating the precursor for hyper-collaboration. Adding to this, I understood that the events which led to collaboration and obtained engagement

from participants were the 'collaborative opportunities'. I had first been dismissive of the idea and told them we would create an exhibition of their services in a building, which we then show the visitors.

Irrespectively, in a meeting, OEM A and Stevedore A proposed their direct involvement by attending the visits. I argued that their efforts should be systematised, as it would not be practical for them to all participate in the visits. After this meeting, I understood that they viewed me as the gatekeeper for the opportunities the visits could bring to their companies.

I understood that their demand could not be ignored, but it also provided a dilemma for my role as the CEO of the port authority. Inviting one company could inevitably create tension with another, and it did not concur with the regulations for public management, where equality must exist. I discussed the situation the participants, and we agreed to develop software that would display the services of all the companies within the Port. This formulated the idea of creating a ''Business Platform'' that could promulgate their services.

This coined the idea of a system that could show the service of companies operating within the offshore wind operations in the Port. This provided the possibility for each of these companies to collaborate but also gave access for the discussed visitors to contact the companies. This would allow companies to visualise their merit in perspective to the overall network of services for the offshore wind industry. Exemplified, if all the stevedores argue that they can perform all the services needed in the offshore wind segment, they will compete fiercely. Contrary, recognising their capability in conjunction with those of the peer stevedores could eventually initiate the hyper-collaboration. This provided some form of membership in the system, and the possibility to mature the idea together with the participants. I understood that this sensemaking for each company entailed historical and situational awareness while their commitment depended on how they all accepted to use the ''Business Platform''.

The ''Business Platform'' encompasses the findings where the participants advocated organised collaboration. The maturing of the idea was developed jointly with the participants through several meetings. In the first meeting, the participants were required to be involved in the many visits to the Port, which they saw as an opportunity. The data from this meeting was captured in my observations, but it was in the following meetings that the idea matured. The ''Business Platform'' was relevant for the companies as it provided an opportunity and did not need to consider the social contagions. Further, current contractual relationships did not influence how they promulgated their services, allowing me to act with the participants and formulate my role as gatekeeper.

4.11 Concluding on the empirical evidence

The empirical evidence revealed that creating opportunity would gain wider acceptance among participants compared to action that carried risk to the individual company. One could argue that when it was risk-free to participate in a

social event, the buy-in was readily available, but observation suggested that this did not always lead to action. Moreover, the formative-social-system was evident, and in several situations, the participants with the highest centrality exercised their powers. Finally, participants' actions would be affected by the change in the operating environment, which problematised any planned action.

This situation was not surprising, as the literature review on collaboration in ports rapidly had taken me from position, productivity and cost to the complexity of how a formative-social-system was affected. In the case of Port Esbjerg, the data collected and analysed led to the learning that collaboration had to be organised. Further, the subject on which the participants had to collaborate had to be forward-looking and represent opportunities. To link this to the strategy of the companies the participants represented, I also found that they requested the design of their services and sharing of knowledge, which indicated that they viewed hyper-collaboration as a permanent phenomenon.

In context to the business / management problem, it was noted that for Port Esbjerg to remain epicenter for offshore in Europe, the companies operating in the port had to possess similar worldview and find new way of working together that could lead to hyper collaboration. The empirical evidence found that buy-in to certain world-view and subsequent action was depending on risk and opportunities, and rationale did not always prevail in the decision-making. Conversely, the study provided an understanding of the offshore wind activities in the Port Esbjerg in relation to the social-formative-system imperative in the competitiveness. The notion that opportunity will improve acceptance was found affirmative, while organization of the collaboration was needed to ensure consistency. The research question requires a framework to be developed for port authorities and companies to work together, which would lead to hyper-collaboration.

To find solutions that could be developed jointly with the participants, I found rhetoric, relevance and trust imperative in finding a plausible answer. In the event described in this study, I was accepted as the gatekeeper but was not expected to direct the change. This change required the anonymity that only a system could provide. In context to the literature reviewed it was found that port competitiveness is hinged on improving transaction and this became the model for creating the ‘Business Platform’, wherefore the participants and I commenced working on the system’ as the precursor for hyper-collaboration.

The business/management problem in essence required action from the companies within the port to take certain strategic decision, that initially was envisioned by the port authority, who in return held no power towards the decision-making of the companies. The rationale of the action cycles and the empirical evidence collected was to find out how I could engage with the social-formative-system to create the framework for hyper-collaboration. Thus, the finding during the various actions and observation taught me that the business / management problem could be systematized, while the research question relates hyper-collaboration to competitiveness.

There in causal linkage between the findings in the literature review on port competitiveness related to improving transactions, to the quantitative data depicting that efficiency in the load-out operation for offshore wind will provide competitive advantages. In between these two observations is the collaboration in the social-formative-systems, which remain the epitome of this study and represented in the outcome of the action cycles. The implementation of the action cycles matures in the development of the 'Business Platform', which systematize opportunities and allow these to be matched with the capabilities of the companies operating within the spatial cluster of Port Esbjerg. The rationale behind creating the 'Business Platform' as found collecting the empirical evidence is depicted below, while it is the systematization together with the acceptance of its use by the participants that ensures that implementation is sustainable.

CHAPTER 5, DEVELOPING THE PRECURSOR AND FRAMEWORK FOR HYPER-COLLABORATION

This chapter evaluates the transformation as described in the research process. It does that by testing the precursor with the participants and verifying the competitiveness of the idea. This testing initiate the framework. Further, this chapter describes the interaction using participative action research and the consolidation phase for developing the framework for hyper-collaboration.

5.1 The idea for the precursor and initial engagement

The narrative of the research idea was to increase competitiveness through sharing resources. This phenomenon exemplifies the basic concept of hyper-collaboration, described by Kolk et al. (2018) as an ecosystem player. In this context, hyper-collaboration is a phenomenon that enhances the ecosystem, and the 'Business Platform' should be the catalyst.

The idea of the 'Business Platform' had rapidly progressed with the engagement of the participants. Still, the empirical evidence suggested that their commitment to any action varied. The commitment was more straightforward to achieve in pursuit of opportunities than in dealing with threats. In the interview's closing question, I had asked, 'How do you think a tender platform may assist in developing hyper-collaboration?'. To this question, I found some form of consensus from Stevedore A and Stevedore B in their replies.

Stevedore A concluded that 'A tender platform is problematic if it exposes the availability of the companies and buyers' use this information in negotiations. Thus, stevedore A identified the need for a filtering system for accessibility, and implicitly agreed an independent company should operate the platform. At the same time, Stevedore B stated it to be risky 'if participants would expose their availability and competitors can react on this. The concerns exhibited that participants were more interested in what the competition would do than what they could collectively achieve. The participants adjourned on the threats, but I considered opportunities to be recognised if I could demonstrate that this would increase their competitiveness.

I decided on a triangular approach for developing the ''Business Platform'' to commence this. This approach should allow the participants to list their service in conformity to their service in the port ecosystem, seek outside collaboration, and finally allow customers to tender for services. I added the intention of the ''Business Platform'' to the agenda of the Port Advisory Board to verify the approach. The board consist of twelve members representing various business segments within the Port. The members include stevedores A, B, C and OEM A. Nevertheless, the idea of the ''Business Platform'' was rejected by the participants, who noted that they would like to see the final system completed. In addition, I sought to bring validity to the discussion when I argued that one of the local legal firms was selected to manage the ''Business Platform'' to ensure independence.

One of the members heavily opposed this and argued that the legal firm was not independent. The question of independence may have derived from the fact that one lawyer from the legal firm concluding on the legality of the 'Business Platform' was a member of the board of Stevedore B. The Advisory Board meeting was held online due to the ongoing pandemic, so judging the other participants' reactions was impossible. As a result, the Advisory Board abandoned discussions on the 'Business Platform'. This lack of conclusion affected the idea verification, and I had to re-evaluate and re-assess. Reflecting on the situation, I reverted to Malenko's (2014) discussion on decisions on corporate boards. He argued that if directors vote on private signals, the outcome is a conflict of interests, and conformity is detrimental to the decision.

The situation puzzled me, as the person opposing was not competing with the others and should therefore not have conflicting interests. Reflecting on the case during the Advisory Board meeting, I promulgated how the 'Business Platform' would benefit the offshore wind segment to gain common goals when depicting an opportunity. Thus, I assumed that the opposing person viewed the situation as being deprived of an opportunity. The 'Business Platform' should have given him the same possibilities as those operating in offshore wind. During the subsequent discussion with the Chairman of the Advisory Board, who is also the participant from stevedore B in this research, it became evident that I needed acceptance from the opposing board member to progress.

The following day I discussed the situation with the Chairman of the Advisory Board. He requested that I contact the opposing member before he would endorse the plan. I could not suggest another Advisory Board meeting, nor could I seek consensus among participants without the approval from the Advisory Board. Therefore, it was imperative to obtain the buy-in from the Chairman of the Advisory Board. Reverting to the Carbon Pledge situation, I noted that engaging the company with the highest formal power made it possible to encourage progress. I envisaged using a similar approach in this situation. I used the below correspondence in the sense-making process.

Date	Event	Sense-making	Response
Day 1	The Advisory Board meeting was held, and one of the members questioned the use of the specific legal firm.	The member might have opposed two reasons: a) because the legal firm was intertwined with Stevedore B, or b) because he saw no immediate benefit to the 'Business Platform'.	I needed to understand why the discussion ceased progressing and the opposing member's reasoning.
Day 2	I discussed the situation with the Chairman over the phone, who advised that I contacted the opposing member and informed him that his agreement was required before the 'Business Platform' could be endorsed. .	It provided me with a dilemma, as a negative response from the opposing member would have ceased progress.	The risk of opposition needed to be limited before I could contact the opposing member
Day 3	I called the legal firm and discussed the situation. As a result, they agreed to use their representation on the board of Stevedore B to gain their acceptance of the 'Business Platform'.	This acceptance would allow me to obtain the Chairman's endorsement before contacting the opposing member.	I assumed that the formal powers of the Chairman could persuade the opposing member.
Day 6	I called the opposing member and advised that it would be the IT company that had developed the 'Business Platform' to hold the data entered, not the legal firm. This information led to acceptance from the opposing member, only if we could control this from the Port without involvement from the legal firm.	I considered progress to be more critical and believed that I could achieve this with minor changes to the initial setup of the 'Business Platform'.	I needed to inform the Chairman and get his acceptance.

Day 7	I again called the Chairman and advised that the Port would engage an internal resource to assist with the data entering the 'Business Platform' and that the opposing member had accepted this.	I gained the Chairman's endorsement and assumed acceptance from Stevedore B through these actions.	The IT developer and internal resources needed progress, and I initiated this work.

Table 17 – Communication in Sense-Making

To gain acceptance, I sought consensus by changing my position. My initial thought was to use the legal firm's formative power over the stevedore B by being a member of their board. Contrary, my belief in the 'Business Platform' had created urgency. I adopted the consensus-seeking action of having an internal resource managing the 'Business Platform', thereby avoiding the perceived threat of involving the legal firm. When I reflected on the situation and the learning from the Advisory Board, I found similarities in the notion that there is a gatekeeper in the port ecosystem due to an underlying tendency to avoid disagreement. I found that challenging, as innovation prospers within the tensions of disagreement. I formed a system in the 'Business Platform' that would connect companies and develop opportunities. I needed to explore the port ecosystem and evaluate how I could implement the 'Business Platform'.

5.2 PAR and consolidation for developing the precursor for hyper-collaboration

In perspective to the governance structure and the obligatory passage point in the port ecosystem, the issue of hyper-collaboration converged on the topic of capability and agreeability. Concerning the implementation of the 'Business Platform', it was evident that once the participants accepted progress, they needed the capacity and interest to be part of the development. Collaboration would only exist if these capabilities supplemented each other towards a common goal. I envisaged that such powers could collaborate on large contracts or supplement companies' abilities to improve business possibilities.

In a meeting with the participants, I learned that the acceptance parameters were the perception of threats and opportunities. Participation would lead to an opportunity and the participant would be deprived of the opportunity if the participant elected not to participate. I believed that my engagement, coupled with the participants' experience, would collectively promulgate the future possibilities and thereby create the unambiguous and common worldview needed for collaboration. Reflecting on the situation with the Advisory Board, I had to decide which participants first to engage in implementing the 'Business Platform'. I assumed that the selected participants would agree on the underpinning elements and form a collective view based on the reality of the situation and their acknowledgement of action. In the offshore wind market, the worldview could be derived from the collaborative agreement on the current situation and envisaged future perspective.

I argue that this approach requires leadership to promulgate the story and gain the participants' acceptance of the possibilities. Conversely, if I had to take this leadership role, the participants had to acknowledge my role as the leader. Reflecting on the empirical evidence I had collected, the interviewees embraced the idea of hyper-collaboration but did not request the port authority to be the facilitator. Contrary, the actions that created the best buy-in were when

the participants with high centrality in the port ecosystem had promulgated their requirements, and I had been the facilitator. However, this memetic approach had also made undesired responses. I had reflected on actions in contemporary situations and found that the reactions from the various participants had often been unpredictable.

I formulated this as stevedore A not accepting that the port authority took the leadership role to facilitate the safety pledge. My actions followed the arguments for deliberate change without hierarchical influence, which Nørskov et al. (2017) argue the involvement of informal change agents and the importance of change by conviction. As I represented the port authority, I realised that I was the gatekeeper and recognised that other change agents were needed.

Earlier action had taught me that use an outside facilitator-led to resistance. I, therefore, considered the participants advocating for collaborative opportunities, to be relevant for implementing the 'Business Platform'. Subsequently, I included them in the meeting with the IT developer to conclude the design of the 'Business Platform'.

Further, my arguments had not automatically created the desired effect when seeking the acceptance of the 'Business Platform' in the Advisory Board. This behaviour also illustrated how each participant would make decisions based on their perceived possibilities. Uncontested behavioural changes in the formative-social-system will influence the participants' judgment, which relates to cognition and acceptance of possibilities.

Evaluating the framework for collaboration in Port Esbjerg, I recognised that the port ecosystem did entail companies that beneficially could collaborate to achieve an advantage over other port ecosystems competing for the same activities. Therefore, I requested that participants Stevedore A, B and OEM, who had demanded to be involved in the many visits to the Port, map out the pre-assembly activities' supply chain. Their initial demand and acknowledgement of the task illustrated that these participants were more positive towards the collaboration towards opportunities and, therefore, could act as the change agents. Furthermore, their supply chain mapping could explain the conceptual and physical factors and identify if hyper-collaboration may improve the competitiveness of the Port. Therefore, the participants must portray the supply chain as a social value-adding flow to enhance competitiveness.

Contrariwise, the supply chain for offshore wind, illustrated by Poulsen and Lema (2017), represented the linear flow of consent, inbound logistic, installation, operation and maintenance to decommissioning. Poulsen and Lema (2017) portrayed the logistic perspective, while my view considered all the companies bringing value to a specific activity from a social standpoint. Epitomised for offshore wind ports, these form part of inboard logistics. Their capacity only creates value if the companies in the Port can deliver the pre-assembly and load-out service needed to proceed to the offshore wind farm installation phase. I, therefore, evaluated the supply chain in the context of the port ecosystem. This evaluation required me to understand whether the selected participants could influence individual belief, judgment, and collective behaviour. Such heuristics called for similar worldviews, where the companies embark on

investments in capacity and capability. I portrayed this situation in the governance structure of the port-ecosystem as the passage point to enter the meta-system and the supply side.

At the same time, factor and demand conditions intertwine with the port ecosystem. In ports where there is a lack of areas available, the port capacity affects the competitiveness of the remaining supply chain, as companies will not be able to expand their activities and efficiency will be jeopardised with the congestion and waiting times that inevitable will be the result. Therefore, the value of all the companies will decline if the port authority does not take action and improve the infrastructure. In this situation, the port authority must also be the decision-maker and perform the investment in the required expansion. Conversely, the port authority can be the gatekeeper who influences the worldview and collaborate with the companies to enhance their future activities. Therefore, the port authority and companies need to operate in a strategic symposium and create mutual enactment based on their interdependencies.

The situations of enactment in the port ecosystem made me consider meritocracy, which according to Kim and Choi (2017), developed the 'equality of opportunity while stating that 'the concept of merit may vary according to the context and culture'. I envisaged the need for companies to visualise their merit in perspective to the overall network of services for the offshore wind industry as the starting point for hyper-collaboration. The ‘Business Platform’ should cater for this situation. I understood that if all participants argue that they may perform all the services needed for a pre-assembly operation, they will compete fiercely. However, recognising their capability in conjunction with the other participants may initiate collaboration. Such collaboration required the companies to be part of the value-adding activities, accept their inclusion, and endorse the gatekeepers, which could influence the worldview. To deliver their services to a specific segment, they need to act with transparency on merits. Still, when engaging with the participants, it became evident that their perceptions of the opportunities in several cases were beyond their capabilities. A discussion with Stevedore A on supporting offshore wind operations in other ports depicted that lack of capital hindered such expansion. This hindrance proclaimed another issue when considering meritocracy as the enabler for hyper-collaboration.

Not surprisingly, do my findings mirror the deliberate models from Petticrew and Whip (1992), Donnan (2005) and Checkland (1981, 2000), comprising appreciative inquiry, soft system methodology, content, process and context as methods to understand the situation and develop the further action plans. The enactment situation in the social-formative system coincides with Petticrew and Whip's (1992) view of strategic change as an array of factors and fundamentals. However, these are emergent in social systems, and the system is irreversible and often unpredictable, as Dooley (1997) stated about complex adaptive systems. To combine all these observations, I needed to develop a collaborative system and verify my position as the gatekeeper.

I believed the 'Business Platform' would create the precursor for hyper-collaboration, which I foresaw as a phenomenon of co-evolution in the port ecosystem, and thus not limited to a specific situation. McKelvey (2002) discusses co-evolutionary dynamics and symbiotic co-evolution and concludes that heterogeneous participants with adaptive capabilities and the ability to influence each other must be present. Mckelvey (2002) also argues that a higher-level constraint must motivate the co-evolution and initiating events. In this context, I reverted to the actions and observations that resulted in the enactment and displayed the initial steps towards collaboration while considering myself the gatekeeper. This dependence on my role, representing the port authority, allowed me to think about how such a situation could be systematised and promulgated. My gatekeeper position required decision and action.

This view does not consider the situation where port operations merely present nodes in networks. To do this, I envisioned a shift from the linear supply chain perception to the description of the services. Therefore, a meeting with the participants was held and I announced that we would develop the 'Business Platform' for collaboration purposes. The participants needed to be involved in mapping their combined services for pre-assembly activities. Easterby-Smith (2011) concluded that knowledge is only significant if based on objective reality. I argue that the 'Business Platform' allowed the participants to collaborate on opportunities for activity and development.

The participants prosper when the installation of offshore wind farms is conducted from the Port. Increasing the activities allows for efficiency and operational gains, and the companies become more competitive. To enable this situation, the involved companies must work together, providing cost-efficient and effective service for the complete system to excel. The workflow was mapped as detailed below, which allowed me to progress with the setup of the 'Business Platform'. Reflecting on the situation, I acknowledged that these participants and their collaboration in mapping the workflow had accepted me as gatekeeper. Further, these participants could also be change agents in creating the interaction needed to hyper-collaborate.

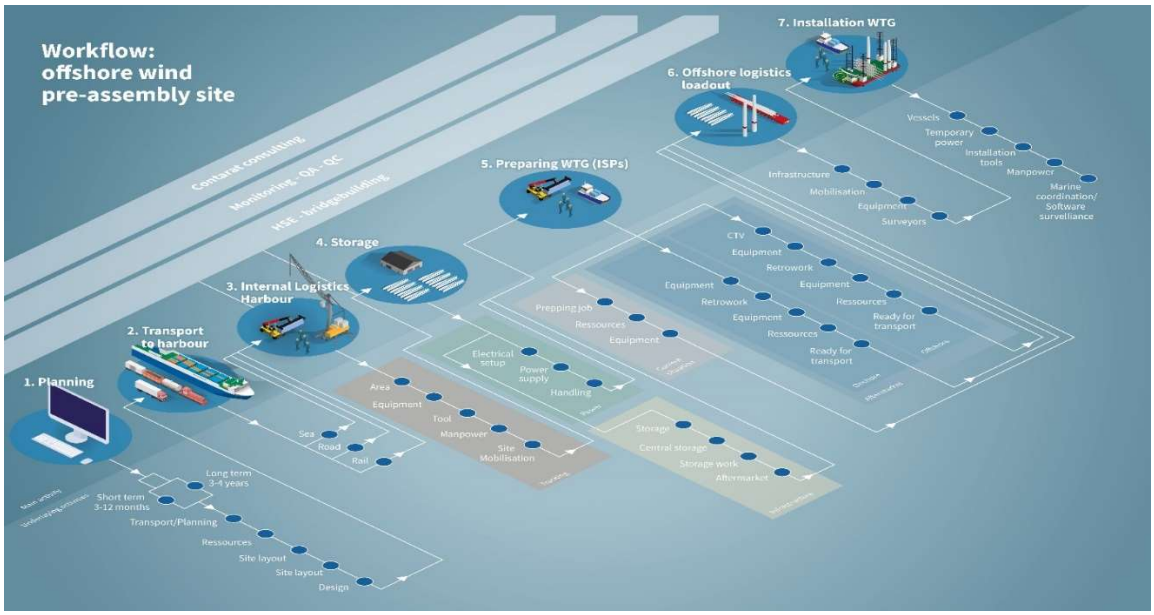

Figure 8 Mapping of Pre-Assembly Activities

The 'Business Platform' was initiated as a system where companies could list their services. Still, the 'Business Platform' also depicted the value that could be brought into the ecosystem without increasing competition and eroding the strategic position of the individual company. Thus, I found that coherence in the services is displayed with the activities. Exemplified, the 'Business Platform' displayed the participants' collaborative activities, allowing them to showcase a comprehensive service that would only mature if they collaborated. If an element of services was lacking, the system should cater to participants to collaborate and develop such services or engage with other companies to bring required services into the port ecosystem. Such a phenomenon would create the building blocks for hyper-collaboration.

In the meeting with the participants, presenting the workflow for pre-assembly activities, it became evident that they understood they needed to collaborate with other companies to deliver on the value depicted in the mapping. Stevedore A raised the question of how it could be assured that the companies allowed to participate in the 'Business Platform' had the track record to add value. In this situation, I presented the dilemma that the port authority could not legally prevent companies from offering their services. Still, having a legal firm managing the Business Portal could control which companies should participate. This did not gain acceptance of involvement of the legal firm, and agreement was made that the track record of the individual company needed to be included in the 'Business Platform'.

This situation illustrated my rationale for developing the framework for hyper-collaboration through participant understanding of their capabilities and constraints in context to the activity of the port ecosystem and the combined competitiveness. I argue that the conventional view of the supply chain and individualistic manoeuvring derives from the actions of the competitors. I say that hyper-collaboration displays cohesive approaches to the development of

social ecosystems. Service delivered from a company is traditionally regarded as the activities from instruction to ensuring delivery to the customer's expectations, while competition is considered actions towards peers.

The truism that strategy, structure and rivalry result in innovation and competitive advantages may only be valid when companies react to growing markets or outwit the constraints of the social system they are considered members. Empirical evidence found during my research suggests that rivalry in the social-formative system led to resistance, which only succumbed to the perception of opportunity for the individual. This perception of future possibilities created a formative social power but provided no evidence of resultant change. Here, the systematisation of actions was evaluated, and I noted that the participants encouraged change through intervention from other parties. This suggests that taking a leadership role would affect the balance in the social-formative system and elicit pitfalls of acting as a leader in non-hierarchical settings. The 'Business Platform' may be argued to systematise the intervention based on participants recognising their position in the social-formative system.

This reverts to the formative-social-system related to offshore wind and how this was related to the port ecosystem. The situation in the Advisory Board pausing progress on the 'Business Platform' depicted how judgment from one participant may affect the formative-social-system, even when this participant is considered an outsider. To progress, it was essential to revert to the possibility that the change could lead to, but also consider the formalities and hierarchical structures among participants while continuing to muddle through in a consensus-seeking matter. This research entails participants who interrelate through contractual relationships while their actions are intertwined in their joint deliveries. Their norms, beliefs, and judgments were developed through interaction over a prolonged time, even though the situations resulting in action were bespoke to the various situations. I suggest that their actions could be predicted.

In this context, the initiator for enactment is a combination of knowing the participants and the situation. I considered the practice based on the sequence of enactment leading to change. I found that relevance and urgency, and importance carried the legitimacy that involved participants that enacted the situation. Commensurate, my involvement as gatekeeper was needed to create the action. In this context, I found it imperative that both the port-ecosystem and the formative-social-system are evaluated in tandem with situations creating both opportunity and threat. I found this to be the combination of opportunity, buy-in from the participants and gatekeeper. This learning allowed me to conclude on the precursor for hyper collaboration, as detailed in figure 9.

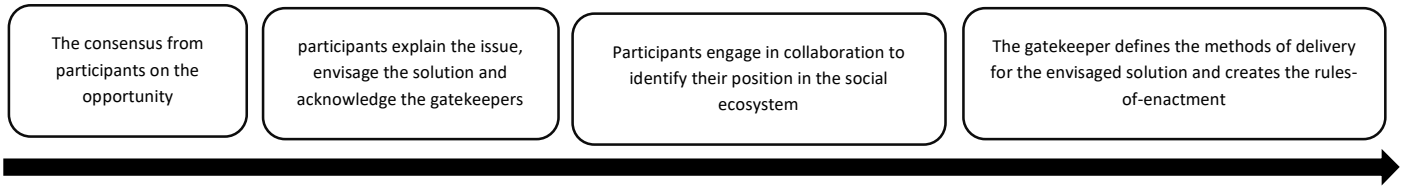

Figure 9 – Precursor for Hyper-Collaboration

Debatably, it was necessary to evaluate the precursor in context to other models for consensus building, decision making, and action before commencing the description of the learning, reflection, and sense-making. The precursor was envisaged for situations where change was accepted by the participants, and they saw an improved opportunity in the collaboration.

The precursor, therefore, deviates from planned change models, considering awareness, desire, knowledge, ability and reinforcement, to deliberate change pursuing an overall coherence. This was important to note as the precursor was intended to change the dynamic in the formative-social-system without shifting the powers in the existing relationships. The importance of inter-organisational and interdependence relationships within ports was argued by Seo et al. (2016), promoting that the actors' goals converge, and knowledge is shared through the advantages of a mediator. Seo et al. (2016) also noted the limitations and suggest that future supply chain collaboration in ports identify the collaboration leader, coordinator and members.

I needed to evaluate how I had derived from this process, and I had to understand if the precursor could lead to rules of enactment among participants. Cohen and Bradford (2003) emphasise this in their statement that a key to influence is thinking of the other person as a potential ally. This partner question is the precursor's inauguration, where consensus among participants is based on an accepted opportunity. In this context, the research from Cohen and Bradford (2003) appeared relevant when they divided the interaction between inspiration-related, position-related and relation-ship-related currencies and implicitly argued that all of these should be used to gain the power to achieve collectively beneficial goals. I found this a critical argument when considering the deliberate change, where content, process and context are imperative in progress.

I acknowledged that it was critical to identify issues in formative-social-system and initiate change required decision. I needed to consider how this change had to be performed. Franke (2011) discussed decision-making in complex and uncertain environments and argued the heuristics as anchoring and adjustments, representativeness, availability and affect. My observations suggest the commonality of centrality in the functioning of the port ecosystem. Franke's (2011) argumentation for moving towards sense-making methodologies and understanding the complexity implicitly underpin my observations.

The Cynefin framework can also be used to systematise the formative-social-system and provide a tool for reading the situation. It could move the complexity towards a known situation, stabilising the formative-social-system and changing the power structures. Arguably, such action would shift the situation towards certainty but may also pause co-development. The precursor for hyper-collaboration, therefore, defines the gatekeepers early in the process but acknowledges that the gatekeeper may not be the decision-maker. I suggest that this prevents indecision, which may be detrimental to the function of the formative-social-system.

Charan (2001) advocate that dialogue, candour and informality aid decisiveness, while I suggest that this requires certain organisational boundaries. In organisations, members are formally enrolled, which provide an acceptance of the norms and beliefs inherent in the organisational culture. Contrary, in complex settings, the commonality of the participants is that they conduct their business activities independently and while their activity is intertwined, they are not necessarily formalised. To create hyper-collaboration, it is evident that dialogue, consensus and common goals are necessary. Still, trust and transparency allow the participant to recognise the issue and envisage the solution. In the formative-social-system, the caveat was the previous history of interaction that presented traps of anchoring and status quo in decision making. Hammond, Keeney and Raiffa (1998) argued that data could be presented to avoid traps. I also observed this in the engagement with the participants, where the diversified interest of engagement depended on their perception of threats or opportunities. I, therefore, concluded that the 'Business Platform' would present opportunities for the companies seeking to increase activity. Contrary, the 'Business Platform' could also be viewed as a threat if it would allow more companies access to the potential customers. To gain acceptance from the participants, I understood that the system had to present an opportunity to all involved.

Conversely, I had not found any linear effect between the engagement and the result in the formative-social-system. Empirical evidence suggested that participants would engage when a threat was considered low, and a reward was possible but would also accept that the status quo remained. This situation opposed the initial findings, where the importance of development was recognised, but most participants believed outside support was needed to progress. In the precursor for hyper-collaboration, I have recognised the gatekeepers and considered the decision-maker when selecting the delivery method and the engagement rules.

Reverting to one of the meetings with the participants for the collaborative opportunities, we discussed the desire from Stevedore A and C to standardise contracts, where replication of the CRINE contract from the Oil and Gas Sector in the United Kingdom was argued. In this case, standard contracts were induced to create cost savings. The argument was also plausible in Port Esbjerg as standard contracts would simplify the interaction between the Stevedore and OEMs, where their current contracts were argued to display the power of OEM A. This portrays the anchoring trap discussed by Hammond, Keeney, and Raiffa (1998). To prevent this, the precursor for hyper-collaboration envisages participants engaging early in the process to define their position in the formative-social-system. This will also present an opportunity to identify how they may act incoherently.

In this context, Macloud (2014) argued that rhetoric was one of the most successful means of dealing with crisis communication. On the other hand, Mitroff and Pauchant (1988) say that only the self-inflated organisations are crisis-prone. Comparing these arguments to the social-formative system in the Port, the views of Macloud (2014), Mitroff and Pauchant (1988) differ as they relate to the organisations with predictable decisions and influence, which implies

causation. The precursor for hyper-collaboration, therefore, considers the gatekeepers with decision-making or influential roles.

Therefore, the precursor also suggested that the gatekeeper defines the delivery method for the envisaged solution. Ethos, mythos and pathos may be instrumental in delivering the solution, as observed during the initial introduction of the 'Business Platform' to the Advisory Board. During this episode, it may be questioned: a) if I was the right spokesman to deliver the message, b) if the trust existed among the participants to commit to the change, c) if any of the participants should have been the gatekeeper.

This pivots towards the relationship between trust and accountability, which was also discussed by Ammeter et al. (2004, p. 61), who argue that "the enactment of trust and accountability overlap". This conjunction between the organisation belief and collaborative acceptance of responsibility requires trust to create the acceptance of the persons who effectuate the change. In this case, the deliberate change approached the incremental or planned change, and the discussion on postmodernism and the fractal system became relevant in context to the precursor for hyper-collaboration. In an organisation, the hierarchical system prevails, and the echelons can assert their influence through leadership. By achieving this, such a leader can obtain trust, instill accountability, and use such a situation to plan change.

In this research, the participants represent multiple companies with various norms and cultures, each with leadership that operates independently of the other participants. The commonality among these companies operate within the boundaries of the port ecosystem, while the port authority has no direct influence on the decision-making among these participants. Deliberate change may therefore only be initiated with overall coherence. To apply the precursor for hyper-collaboration, I deemed it necessary for participants to engage and demonstrate accountability. This was arguably portrayed by the participants collaborating on mapping pre-assembly activities. Therefore, this is projected as the case for plausibility testing of the precursor for hyper-collaboration. This, I also considered imperative in creating the rules for enactment included in the precursor for hyper-collaboration.

The initial engagement suggested a power structure among the participants, which could create leaders and followers. Contrary, the actions had revealed that this only carried limited factuality, while formal relationships had precedence. Autocratic behaviour from OEM A holding the contracts with the participants was evident in the interview when it was expected that the stevedores should take action towards hyper-collaboration. The request for participants to collaborate only to benefit OEM A mirrored static supply chain behaviour that earlier had not initiated any form of collaboration. This formality between the participants in the supply chain did not allow for self-regulating behaviours. The formative-social-system depicted a setting where none of the participants had been able to initiate collaboration. Conversely, the longevity of this research allowed for observation and engagement in various situations, which

revealed that enactment could be achieved with perceived threat or opportunity. The evaluation of outcomes can be discussed from the port ecosystem perspective, commencing with the meta-system and governance, before considering the social-formative system and my role.

The precursor required cohesiveness among the participants, so they had to collaborate. I tested this situation with the group mapping the pre-assembly operations. The group consisted of OEM A, Stevedore A and B, and OEM A, whom completed the work over several meetings where I acted as gatekeeper and later facilitated the systematisation of the 'Business Platform'. The mapping from the group was bespoke and accurate, as these participants had been involved in operations for several years and held contractual obligations and pre-determined positions in the supply chain. However, this was the first time they collaborated to map the workflow for pre-assembly operations.

The result was that these participants now appreciated how each of their services was incorporated into the supply chain. More importantly, by performing the mapping together, they accepted their position and relation to each other. This may be argued as a basis for collaboration and raising awareness about inclusion and competition. In a meeting held after presenting their mapping of the pre-assembly activities, the outline was for me to endorse the work and include this in the 'Business Platform'. The purpose was to promulgate their combined services and market them to new customers, but participants also learned which services were missing in the supply chain. This question could therefore be how to engage with companies outside the social-formative system and manage their inclusion without changing the existing dynamics.

The discussion and worries during the meeting divided OEM A and Stevedore A by their respective situation. The formative-social-system caused behaviours that led to participants favouring the individual and not necessarily the group, thus demonstrating an example of reflexivity among participants. I argue that reference to such a formative-social-system can be found in Porter's five forces, where one of the participants represented the buyer seeking more power and the other the supplier jockeying for more work. In essence, OEM A would like more competition among the Stevedores, while the Stevedores did not see further competition is advantageous. This reverted the situation towards a static supply chain paradigm with a push-and-pull relationship.

Consequently, particpants decided to determine the requirements in the 'Business Platform' and thereby decide on a uniform approach to displaying their service. The situation did not dictate that participants could only increase activity through the 'Business Platform', but due to the group's initial goal to be part of the numerous visits to the Port, the acceptance of me as gatekeeper was plausible and accepted. The precursor is, therefore, the connection between the goal, gatekeeper and progress. This progressed to the 'Business Platform', demonstrating the efforts to promulgate the participants' service and their initial steps towards hyper-collaboration.

5.3 Promulgating the idea and engaging the decision-makers

The 'Business Platform' had to be based on causation. The combination of participants and circumstances would allow for progress in a single situation and where the issue presented can only be solved by hyper-collaboration. Further, hyper-collaboration dictates that interaction is self-regulating and to the benefit of all the participants, and they must achieve this through consensus and collaboration. I understood that the 'Business Platform' should display the outcome from the precursor of hyper-collaboration. The 'Business Platform' was developed to systematise enactment to include three interlinked paths, visualise the services of the companies, gain access to more activities, and attract capital when needed to expand their service. The services detailed the workflow developed by the participants operating within the offshore wind segment and then described their services in context hereto. A tendering 'Business Platform' allowed outside companies to request services and reach all the participants. Further, the investment 'Business Platform' was envisaged to source investment projects and seek co-investors or collaboration.

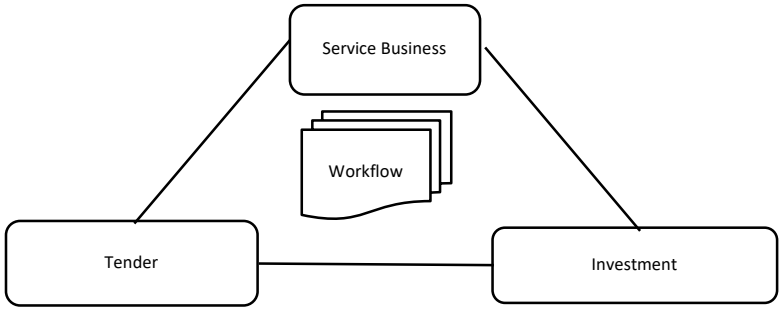

Figure 10 – 'Business Platform' Mapping

Therefore, the 'Business Platform' allowed services to be promulgated, acquired and developed in context to the workflow describing the value needed to conduct a pre-assembly operation. Therefore, the 'Business Platform' was envisaged to stimulate hyper-collaboration in sharing resources for bidding and conducting their services. This influences the competitive situation for each participant. If access to customers and capital; the 'Business Platform' also offered this option. Thus, the 'Business Platform' deviates from the linear transaction between businesses-to-business or business-to-consumer. Chen et al. (2011) described this as the traditional control paradigm, where balance is achieved through negative feedback. Chen et al. (2011) argued that negative feedback is the stabiliser while positive feedback is the system's amplifier.

This redirected my attention towards the issue of worldview, common goals, and my role representing the port authority. An optimistic worldview requires market possibilities, but in the context of hyper-collaboration, I would argue that these possibilities could be developed by participants working together in new ways. In this research, I found that the participants reacted in a certain pattern when considering opportunities and threats. Further, there appeared to be a certain expectation of my role concerning decision-making in various situations. Consequently, the port ecosystem presented certain heuristics that allowed me to develop the framework for hyper-collaboration, discuss the results, and reflect on the implications.

CHAPTER 6, CONCLUSIONS, REFLECTIONS, AND IMPLICATIONS

This chapter considers the research's results, reflection, and implications. It begins with the research progression and evaluates my involvement with participants before considering the relevant literature and empirical data. Hereafter, I discuss the findings and main points of the framework for hyper-collaboration before concluding on my personal experience conducting the research.

6.1 Discussing the results and progression of the framework for hyper collaboration

The characteristics of the participants were enactment based on shared views related to opportunities and threats. Social contagions influenced the situations where behaviours, judgment, and beliefs played an important role. These appeared to have been formed by history and previous experience, which ensured some form of self-regulating behaviour in the formative-social-system. To understand hyper-collaboration in Port Esbjerg for the offshore wind segment, I conducted fuzzy mapping to understand the formative powers among the participants.

The methodology later became valuable in understanding the dynamics between the participants, as their responses in the interview advocated particular behaviors, which in certain instances would shift when they acted in a symposium. There was a difference between intention and action, which I would not have recognised without building this research around living the experience of actions and reactions in the formative-social-system. The reflection and learning of the formative-social-system allowed me to identify the precursor for hyper-collaboration.

Concluding that the research objective of hyper-collaboration was to create an activity based on possibilities within the port ecosystem, I argue that the framework had to display a linkage between the actions and the result. This link had to be made through the collaborative efforts of the participants determined by the action cycles. Therefore, the progression from the precursor to framework for hyper-collaboration is the action that intertwines with the situation. The 'Business Platform' may therefore be argued as the enabler to creating this engagement. In the empirical evidence, I found that participants took part in the events not to be deprived of a potential opportunity and concluded that possibility would create engagement. Consequently, the framework commenced with an opportunity and described a continuum of interactions in the formative-social-system before reaching a consensus for enactment.

Using what is known to formalise solutions, this enactment presents various traps. The distinctive nature of interaction among participants, who have collaborated in specific ways over a prolonged period, required gatekeepers. As observed with the 'Business Platform', I argue that the issue and solution would not suffice without the gatekeeper systematising the collaboration. Further, the agreement among participants would only materialise if there were a reason for collaboration and need for action. In sum, the framework must describe how hyper-collaboration can create the situation for companies to pursue an opportunity collectively. The framework for hyper-collaboration is thus canonical for Port Esbjerg, and I could evaluate the application in the context of the offshore wind industry.

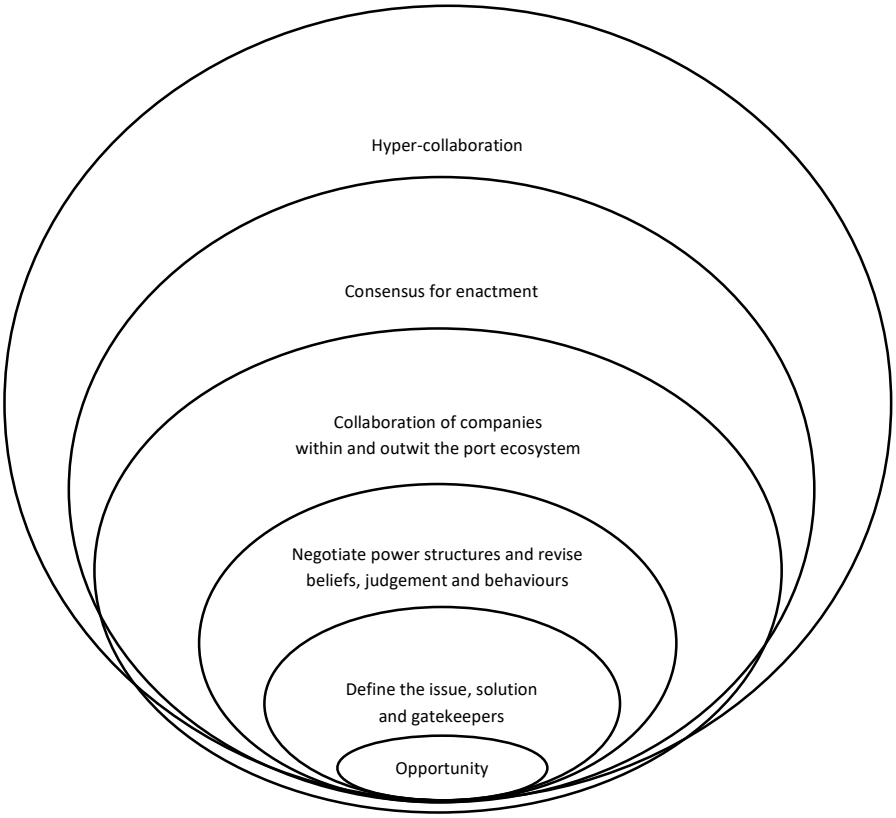

Figure 11 – Framework for Hyper-Collaboration

The framework for hyper-collaboration may be argued to be bespoke to the formative-social-system, but it provided similarities to theory. The literature review shifted from the factors for competitiveness in ports concerning price, productivity, and position towards appreciating that ports are part of logistic networks. Still, from a network perspective, a port is only a node in the overall system, while the competitiveness of the port relates to the activities within the node. The theory of Borondo et al. (2014) on topocracy in networks, where the position in a network determines the power available to an individual, connected the factors for competitiveness to the network that the port form part of. The notion was if the Port became more competitive, the powers in the network would increase.

However, ports are complex industrial ecosystems where myriads of companies conduct operations related to the shipment of cargoes. Port authorities are highly regulated and hold no power over the strategic direction of the various companies but are still expected to create the overall port planning that affects the individual company. This allowed me to determine boundaries for the port ecosystem and visualise elements affecting a situation. The companies need to work together to form a more attractive node in the network and become more competitive.

Considering, Zaoul and Lecocq's (2018) discussions on industrial ecosystems and their statement of networks as independent organisations that aim to achieve collective goals allowed me to commence viewing the social-formative system that could affect the port operations. Given that the issue for this research related to competition within the offshore wind, the activities related to this industry within Port Esbjerg were analysed. This allowed me to identify the

participants and map the formal power structures. These formal power structures were depicted as the formative-social-system, and this research set out to understand how this system could be enacted to build the foundation for hyper-collaboration.

6.2 Reflecting on the framework for hyper-collaboration

The narrative of this research was to create a framework for hyper-collaboration. My initial idea was built on developing the practised sharing economy used in ports. My findings quickly progressed from these thoughts of hyper-collaboration to what it was possible to obtain in the formative-social-system. I found that enactment depended on the perceived threat and opportunities in the concurrent case. In response, the phenomenon was conditional to the participants and may explain why there was a lack of research on the topic of hyper-collaboration. My research found that similar worldviews and shared goals between the participants were present, and opportunities had to exist for participants to act.

In the literature review, I found that collaborations to improve port competitiveness appeared less researched. Ports serve as notes in logistic networks, and I found that attractiveness is almost singular related to the price of shipment between departure and arrival destination. In between these locations, there may be one or more ports and several options for route selections, which also provided the notion that ports may enlarge their catchment area if they operate efficiently and cost-competitive. This observation also provided my arguments for investigating whether collaboration among the companies involved in port operations could improve competitiveness. I identified the port ecosystem to evaluate such a situation, where the supply symbolised Porter's (1979) five forces. In this system, companies select their position based on threats, which I argue also could be viewed as being deprived of opportunities. To pursue opportunities, companies had to collaborate if the perceived solution exceeded a single provider's capacity. This argument discards competition among companies within the port and accepts that collaboration could achieve more.

The engagement of participants created actions and allowed me to learn from the reactions in various situations. In praxis, I based my research on interaction with the participants; therefore, it was possible to identify the enablers for collaboration. Next, I developed action and made suggestions for the precursor for hyper-collaboration. The precursor was tested; hence, it underpinned the framework for hyper-collaboration and highlighted the unwritten belief, judgment, and behaviour that had provided the quandaries and contradictions during my quest for hyper-collaboration.

The use of participatory action research allowed me to be an investigative game player, both in my position representing the port authority and as the gatekeeper in the port ecosystem. This research raises the question of which culture can create hyper-collaboration and why some social settings are better than others. In my research, the participants' actions intertwined with their relationships.

Participatory action research required participants and me to engage in collective efforts to benefit the port ecosystem. The interaction and knowledge sharing allowed us to develop the 'Business Platform' jointly. The research portrayed a knowledge sharing, learning, and adjusting process before completing the framework, which the research set out to achieve. Progressing through the research, I found elements of both ethnographic were used in action and later observation, while I used epistemology to understand the behaviours in various situations.

Conversely, as I was involved in the distinguishing moments that led to enactment, this justified participative action research. This enactment raised questions of defining features, and in this perspective, the culture and background of the participants were relevant. This learning allowed me to evaluate if I could use the framework for hyper-collaborations in other settings within the port ecosystem or if this was specific to the participants involved.

6.3 Evaluating participants and their involvement

The participants were selected based on their operations with offshore wind activities in Port Esbjerg. They had management roles in their respective companies, and all held various academic degrees and had several years' experience in their current positions. In addition, they held concurrent relations through their activities in the Port Esbjerg, where they had present and ongoing interactions with each other. The question remained if this formative-social-system allowed for hyper-collaboration and if obtaining such a phenomenon was possible even if there had been no previous interactions among the participants.

Empirical evidence suggested that their position and educational background allowed for developing a common goal through mutual understanding of their impending situation in the offshore wind market. This common goal also explains the possibility of opportunities that created enactment. Furthermore, the social contagion among the participants had been developed over time, which affected my research. Initially, I assumed that some participants held formative or social powers that could allow for progress. Still, none of the participants would act without my involvement, hence my argument that I am one of the gatekeepers. I also learned that participants' interference outside the formative-social-system jeopardised progress. The concept generation did not engage participants sufficiently, and several feedback loops were necessary. The actions and observations took the findings into broader contexts, allowing me to evaluate situations between myself and the participants. Still, I found that rivalry among participants was not related to threats but to whom should participate in the opportunity. This observation leads to inductive reasoning in praxis, where participants create a similar worldview based on data, generalisation, and observations. I envisioned the progress as consensus-building by identifying conditions where collaboration could exist.

In the open coding of the interviews, I found similarities that could conceptualise the initial action and observation. These interviews could have been influenced by the questions, previous knowledge and experience of participants,

and their relationship with me. I used the open coding principle to create categories leading to discovering multiple categories and themes. The coding revealed multiple facets depicting sequential evolution and situational relevance in designing the first intervention with numerous feedback loops. The interviews displayed an expected influence based on the knowledge of the position in the formative-social-system and the history of earlier collaboration among participants. Commensurate, there were three various approaches displayed in the interviews: a) The supply chain approach. b) The canonical knowledge gained from history, c) The participants recognition of their limitations when they advocated that the other participants create the desired outcome.

Therefore, I needed to evaluate these multifaceted approaches in the context of the decision-making ability of the participants to achieve consensus. I found that in developing initial collaborative change, the best method for consensus among the participants was to consider the order of the intervention, wherefore created actions were deemed relevant to understanding the dialectic relationship between the participants.

I would argue that my engagement with the participants displays sequential evolution. I first sought to sell the idea of sharing resources to increase competitiveness to the benefit of the participants. The interview presented a quagmire of suggestions from participants, while actions and observations displayed how the participants reacted in various situations. This data developed my cognizant constraints from these initial engagements with participants, allowing me to identify situations prone to enactment. The actions and observations implied retrospective analysis and allowed me to understand my influence on these situations. I, therefore, concluded my role as gatekeeper.

My involvement was epitomised by introducing the ‘Business Platform’ This systematisation formed the basis for the participant to understand their position in the social construct. I argue this is needed when developing hyper-collaboration. I found that the relationship between myself and the participants changed during the research. I was acknowledged as the gatekeeper while also responsible for developing the framework for hyper-collaboration. I envision that my willingness to engage in various situations and discuss the opportunities with the participants progressed the participatory action research.

The change in formative-social-system is a combination of several factors, which is why the framework for hyper-collaboration visualises a pathway through the multitudes of factors of relevance. In this context, the relationship and collaborations between port authorities and companies within the port present a new approach to literature on port operations.

6.4 Considering relevant literature and empirical data

The pursuit of relevant literature on ports encompassed writing on the port competition. The reasoning was the canonical idea that hyper-collaboration would enhance competitiveness in the port, and I pursued relevant literature in this context. The literature on competitiveness in ports was broad and focused on the operational environment.

Limited literature considered the ecosystem in ports and how this affected competitiveness, albeit I found an example of strategic opportunities in the work of Haezendock et al. (2018).

The port literature discussed the consequences of certain situations in port in contrast to the methodology to achieve the most optimal competitive position. Lakhmas and Sedqui (2018) exemplify this when they offer a methodology for optimisation based on the symposium of the port authority, shipowner, and stevedores. Conversely, Lakhmas and Sedqui's (2018) research does not suggest how to orchestra the collaboration of the tripartite system. Hence, my literature review progressed toward network theories, and here I evaluated the work of Borondo et al. (2014) on the competitiveness of ports. Here, I considered ports as nodes in various networks servicing many industries. I considered these networks topocratic, and price and efficiency influence the port's attractiveness.

I found the relevant literature on collaboration in networks, clusters, fractal systems, and later ecosystems. My understanding of the port as an ecosystem started with Kolk et al. (2018) writing on hyper-collaboration. Still, Vangen's (2017) work allowed me to find a way through the intertwined situations with the participants. Vangen (2017) implicitly described how navigating among agents is myopia of trade-offs, compromises, and dilemmas. It became a political game to obtain acceptance and change among participants.

In my first approach to creating action, the situation resulted in inaction from one of the participants. This learning was imperative, as it was possible to conceptualise co-development in the port ecosystem. In this context, the writing of McKelvey (2002) was significant when discussing the horizontal and vertical coevolution. I initially envisioned the latter but realised I held no formative power over the participants. This allowed me to create further actions, and I would reflect on the participants' reactions and myself. I found that systematisation would be a building block for hyper-collaboration. The introduction of the ‘Business Platform’ allowed participants to engage in the phenomena described by McKelvey (2002, p.3) to "As the networks develop, the agents may mutually influence each other, thereby starting inter-agent coevolution”. To derive at the solution of the ‘Business Platform’, the idea generation and the objective of the research were correlated and identifiable. The concept of participants collaboratively developing their capabilities and thereby obtaining mutual benefits could enhance the competitiveness of the participants.

6.5 Considering the action cycles

The conundrum of working with social systems in closed environments was presented by the formative social system, which is an integral part of the port ecosystem, which can be illustrated through the outcomes of the action cycles, eventually leading to a collaboration resulting in competitiveness. In this context, it is relevant to summarise how the actions were implemented, the outcomes and the practical knowledge gained, as this led to the contributions in practice.

Action	Implementation	Outcomes	Practical Knowledge
Data collection, idea-creation and initial engagement	The quantitative data underpinned the findings in the literature review on port competitiveness and concluded that the port ecosystem.	The findings on the competitiveness of ports were confirmed to be relevant to Port Esbjerg, and the emphasis on the offshore wind industry allowed for the formal social system to be mapped and the participants to be identified.	The competitive factors for ports were found, and it was understood which of these could be affected through collaborative efforts and who was the actors to get involved when considering the offshore wind segment.
Create action based on gathered information	The coding of the semi-structured interviews dictated that most participants considered organised collaboration to be imperative.	The action of the safety pledge, the carbon pledge and the joint declaration was partly based on suggestions during the semi-structured interview with participants.	The outcome of the first action was less envisaged. At the same time, other activities also portray an example of inaction despite relaying different information during interviews and presenting opportunities for the participants.
Observe participants in action	The inaction depicted the need to observe how the participants reacted in various situations representing both opportunity and risk.	The field observations derived from both opportunity and risk to understand which event would lead to action in the formative-social-system	Meanwhile, when previous or concurrent history affected decision-making, reacting to opportunities could not be ensured. Contrary, responding to risk would be aided by earlier history. Commensurate, there was a need to understand the interaction.
Study the interaction among participants and with the researcher	The inaction to organised collaboration could also derive from adversity towards the organiser or among the participants.	The coding of the researcher's influence during actions and observations, together with the insight into the reaction from the participants, allowed me to understand the role of the gatekeeper.	The situation mirrored the complexity of learning in action, where the difference between interview and actions in the formative-social-system changed with the problem and the formative powers.
Evaluate and re-assess	The homogeneous nature of the formative-social-system made change through organised collaboration problematic, wherefore service design and knowledge sharing, which also had coded from the interviews was, evaluated	When I progressed towards service design and knowledge sharing, it was necessary to note my role as the gatekeeper and the formative powers of the participants, which could prevent direct collaboration.	Understanding the formative-social-system will explain inaction and action and display that even though the system is balanced, the actions depend on the decision-making capability of the participants.
Redefine the issue and create ideas for progress	The decision-making capability derived from participants' behaviours was affected by history and judgment. Further, opportunity and risk appeared instrumental when leading to action.	Systematisation was needed to steer clear of intertwined personal behaviours and make decision-making objectives. This coined the idea of the 'Business Platform'.	Leadership may not suffice to facilitate change in formative social systems, and it will be a combination of multiple actions that can lead to the precursor for hyper-collaboration.
Create allies among influential participants	The governing factors required the 'Business Platform' to be presented and accepted by the Advisory Board. The situation depicted the relevance of understanding the port ecosystem and the factors identified herein.	The 'Business Platform' was questioned by a member of the Advisory Board that was not part of the formative-social-system, wherefore I had to affect the decision-making of the chairman.	The connection between the port ecosystem and the formative-social-system was evident. Hyper-collaboration is self-regulating, and the relationship between these systems must be present.
Developing a framework for hyper-collaboration	The framework commences with an opportunity leading to hyper-collaboration, in-between is the consensus and collaboration needed to drive the change.	The framework for hyper-collaboration may be specific to Port Esbjerg and the activities within offshore wind. Still, more so, it describes the functioning of the formative social system within the constraints of the port ecosystem.	The shift from complexity towards cybernetics, which can be presumed and planned, is imperative for any strategic intention. In this context, the macro, meso and micro environments must align. Then one must know the mechanism that can lead to action and change.
Initiate the consolidation phase	The consolidation phase must be measurable and is therefore hinged on the collaboration for	The 'Business Platform' has, since its inception, gained the acceptance of 177	Achieve hyper-collaboration requires commonality and coherence, which the

	developing and implementing the 'Business Platform',	companies operating within the spatial cluster of Port Esbjerg.	'Business Platform' presented at the time needed to initiate change.

The practical knowledge gained from the action cycles describes the direct effects of research in social systems. The research started by understanding the specific situation for Port Esbjerg in the context of the offshore wind industry, where the strategic intent was to become more competitive. Determining the port ecosystem allowed me to understand the constraints affecting competitiveness in closed systems with a given number of actors. Conversely, the literature review confirmed that collaboration was interlinked to competition in ports, and this affirmed my interest in pursuing the idea of hyper-collaboration.

However, understanding how competitiveness could be achieved through hyper-collaboration required interaction with the social system that could be formative in creating the change. The identification of the formative social system allowed me to identify the actors and approach them to become participants in this study. Furthermore, my position representing the port authority allowed me to enrol the decision-makers in the formative social system as participants. I then needed to understand how hyper-collaboration could be achieved and, from this knowledge, develop a framework that could be used to plan for the strategic change that would enhance competitiveness.

Commencing with semi-structured interviews, I collected ideas for change that could lead to hyper-collaboration. These ideas were used to create action, but when the result was less envisaged, the need for observation of participants in various situations became necessary. Here, it was essential to observe situations that would differ from normal operations, as it would be the reaction from the formative social system that could picture resilience and readiness for change. I acknowledged that resilience was portrayed as inaction. At the same time, the origin of such behaviour was the history between participants, judgment in the situation and the position towards the person seeking the change.

The understanding of own role was meaningful learning for understanding how to affect social systems with entrenched operating rhythms. Leadership was not the key to strategic change in the formative-social-system, and this finding could be embraced by ports in general. The literature review on ports and competition underpinned this argument, as I found no writing on ports that connected leadership to competitiveness. The requirements to lead without power and facilitate action by enacting the companies operating within the ports calls for a framework to emphasise hyper-collaboration, in the essence that this would be self-regulating and the change would be sustainable.

The research moved beyond the interaction in the formative-social-system resulting from interaction among researcher and participants when I understood that change should be systematised and the idea for the 'Business Platform' emerged. This system depicted the initial transition, and the success of the implementation could be argued

to display the participants' acceptance. Conversely, to derive the contribution and limitations, the findings and main points of the research may be discussed.

6.6 Discussing the findings and main points of the research

The main finding was my understanding of how I could obtain enactment in the formative-social-system that could affect the competitiveness of the port ecosystem. An attractive port ecosystem is understood to improve the position in the logistic networks of which the port is part. I found that creating a situation that was different from the norms and entrenched ways of working together while simultaneously providing the opportunity for increased activity would improve the port's competitiveness. Therefore, the research set out to create hyper-collaboration, which proved to develop new solutions in Port Esbjerg, that would not have emerged within the sphere of the individual participants.

I argue that participatory action research represents a model where the researcher acquires knowledge through change. Early in my research, I adopted the common tendency of planned change, moved to the solution and implementation phase, and realised that this approach failed. I initially considered hyper-collaboration to solve the pending issue of increasing cost and believed that this would incentivise stevedores to share their equipment. The situation allowed me to consider the power relationship between the participants and decided to use this to generate ideas and implement actions. Therefore, I needed to appreciate my role in the formative-social-system and understand which actions could gain acceptance from the participants. I needed to observe my position through the lens of the participants to undertake this research and thereby orchestra the necessary action to achieve the objective of developing a framework for hyper-collaboration. Here, I found that their response was affirmative when participants appreciated their position in the social-formative system and the pursuit of hyper-collaboration. Suggestions were accepted when participants could achieve consensus, and I received my role as the gatekeeper.

My primary learning was maneuvering in a complex system, where I had no formal power to dictate progress or change. This situation was very different from conventional leadership practice, where a shared vision and direction allow for a collaborative effort. In hyper-collaboration, participants must invent new ways of working together to benefit all of them. I found a threshold of tensions in this formative-social-system that needed to be overcome by all the participants. I found rhetoric imperative to find the direction, methods, and system for hyper-collaboration.

Hyper-collaboration appeared irrelevant without understanding the participants' collective view on opportunities and threats. This situation illustrated the difference between operating within a complex system and organisational learning. In the latter, the decision of potential benefits is already considered in one organisation, where the first requires causes that must be considered noteworthy in various organisations. To agree on the direction of hyper-collaboration, I found that an accepted worldview and agreed common goal could be obtained among the participants, but this did not lead to action in all situations, and the reaction from participants was often not as envisioned. I found that situations presenting opportunities or threats were needed to create change, but a perceived situation was often

observed to ignite collaboration among participants. I argue that intended collaboration among participants needs to be endorsed by the gatekeeper for action to occur. The idea of a 'Business Platform' would allow the collaborative behaviour to mirror the hierarchical organisational thinking of gaining acceptance before action. Commensurate, the research displayed a linear relationship between establishing a common worldview and the goal to obtain enactment through acceptance of risk or threat. At the same time, it still required approval from the gatekeepers and a system to coordinate the action.

Some conclusions from this research relating to conducting participatory action research in complex systems. Kelly (2005) details some of the traits of participatory action research: multiple realities exist, causing dialectic shifting of understanding, generated through experienced developed partnerships between researcher and participants. MacDonnald (2012) takes a step further by arguing that participatory action research features individual feelings, views, and patterns revealed without the control or manipulation of the researcher, with the primary purpose of imparting social change. Sommerville (2014, p. 3) describes the essence of participatory action research by suggesting it begins with "how can we improve the situation". This raises the question of the situation and how reality is observed. Kim and Kaplan (2011) argued that complex adaptive systems provided a useful lens to understand the motor of coevolution. Therefore, our understanding of coevolutionary dynamics is strengthened by incorporating a dialectic perspective such as actor-network theory to understand how order emerges in practice. Finally, Checkland (2000) proposed the soft system methodology to navigate this complexity by advocating models of purposeful activity with a particular worldview compared to the problem to create action. In this context, I argue that participatory action research in complex systems needs to understand the experience of both researcher and participants, as it may be any of the involved parties or a situation that may create progress. This learning leads to my conclusions about the importance of beliefs, judgments, behaviours, and decisions.

Conclusively, when planning a change to a system involving multiple participants, it is imperative to design the rhetoric that shapes beliefs and develops a shared understanding through communication. Together this learning will result in the desired action if the participants acknowledge the benefit of the action and can make decisions independently. This learning places the decision-maker in the context of a social system, which will promulgate specific criteria or expectations that create bias', which again influences the decision-makers. Therefore, the sum of these factors must be considered an opportunity for the individual to act. To create hyper-collaboration, all the participating individuals must accept the process and arrive at similar conclusions to work together in new ways beneficial to all involved.

6.7 Concluding on own development during the thesis

My first approach was to identify an issue and envision a solution to understand action research. I swiftly realised that learning through action is an appreciative methodology suitable for the complexity of the environments most managers navigate. Yet, I would argue that it contradicted my generalist view of business planning and executing

through leadership. To change a system where participants are connected, without the formal power of leadership, can only be performed with some consensus.

In hindsight, one could question the collective readiness of the participants to hyper-collaborate, given their previous history. The fact that several of the participants earlier had failed collaborations provided me with reflections that needed to be considered on how actions should be conducted and the order in which the participants should be approached. My learning was to engage by creating action, observing, and understanding the intertwined nature of the formative-social-system and, more so, to know how the participants avowed my role.

In this context, I understood that participatory action research represents a period and situation in a formative-social-system. Still, this setting is also taken from the continuum of interactions between the participants. The participants would foremost recognise my role in the formative-social-system based on my formal position while secondarily accepting my position as the researcher and engaging in the study. Given that history existed among the participants, it was essential to uncover how these relations had developed and how this could influence my research. Conversely, I acknowledge that such development had not necessarily occurred in the same setting or situation. Therefore, information and my subsequent learning must be seen in context to the past and present situation factors.

This research taught me to reflect on the situation, understand the formative-social-system as part of the port ecosystem, and keep sourcing the empirical evidence that could be used to build the framework for hyper-collaboration. This led me to pursue activities I could learn from and reflect upon, and my involvement often affected the outcome. I found that the communication and rhetorical standpoint with the participants were imperative and should be the first sequence in future actions in the formative-social-system. Therefore, the significant development was a change in own praxis from idea generation and planning interventions and seeking to influence to observe and reflect on the interaction among the participants and, based on this, select the intervention.

From a practitioner standpoint, the research taught me to apply the idea to a complex system, which I could influence. However, the question remains if the framework could have been tested if I had not represented the port authority. In this case, my position in the formative-social-system becomes more important than the process, and the argument for hyper-collaboration will then be fully dependent on the participants. Consequently, I needed to understand the settings and interactions among participants. The fuzzy mapping and the centrality of the participants in the social-formative setting helped determine the participants. Still, my role, representing the port authority, allowed me to engage with the correct persons within the identified organisations. This access to the decision-makers was critical to conducting this research.

In sum, personal development enhanced my ability to read, understand, and interact in complex environments, coupled with the understanding of the commercial gains from offshore wind activities within Port Esbjerg. During the research, I realised that the desired outcome could only be achieved collaboratively. The engagement required knowledge of my situation and how this affected the participants and an understanding how participants viewed each other and myself. This quagmire of relations and following emotions, judgments, decisions, and behaviours among myself and the participants are all included in the process of inventing new ways of working together. To plan these interactions and following change would not have been possible. Hence, I had to learn in action. In this context, my development was the ability to influence participants, interacting collectively to embark on change.

6.8 Contributions, limitations and opportunities for future research

In business management, the strategies are often understood as leadership, decision and position relative to the operating environment. The intention is to outsmart an opponent by creating a better product or service or simply offering solutions at a lower cost. In the generic strategies, Porter (1985, p. 12) states that "if a firm is to attain a competitive advantage, it must choose the type of competitive advantage it seeks to attain and the scope within which it will attain it". Thus, Porter's (1985) strategy assumes that the strategic powers are vested with the company and its echelons, and their leadership will produce a competitive advantage.

The antithesis to conventional strategic leadership portrays the need to make strategic decisions within social systems, which are highly regulated and where the actors hold formative relationships. This situation applies to multiple ports, where the legislation and the number of actors limit the decisions available to port authorities. The commonality of port operations is that for port authorities to be successful, many actors need to be engaged, and their collaboration is required to create change. The complexity of the social system suggests that collaboration is situational and contemporary and depends on the capability of the actors. This research study illustrates that understanding and working with the participants makes it possible to create a framework for hyper-collaboration, which in theory, could systematize how sustainable change could be implemented in the formative social system. It does that by ensuring that the participants are also the decision-makers and confirming that their interests align with the port authority's strategic intent.

Thus, the result of this research study is limited to Port Esbjerg and the efforts towards competitiveness towards the offshore wind industry. The need for developing a framework for hyper-collaboration was sustainability, where collaboration exists without structured involvement from the port authority or the inclusion of all the participants. Creating such a phenomenon would be a new way of working together, where each company knows their merits, and collaborating makes them more competitive. The pursued interdependence on specific participants dictated the need for systematization, which blended the discipline of knowledge, action and learning with the practicality of leadership and change in praxis. In this context, the 'Business Platform' could be the incubator for collaboration. Still, it will be

the understanding of the formative power within the social system that dictates how change can be constructed and if it becomes sustainable.

This research study carries the limitations of the formative-social system in Port Esbjerg. Still, it does introduce the notion of hyper-collaboration. It illustrates the definition of achieving a mutually advantageous situation in a defined setting that possesses specific attributes of a complex system. The research study does that by developing the framework for hyper-collaboration, which is currently used in Port Esbjerg. However, to declare hyper-collaboration, the formative-social-system must be studied over a more extended period where the competitive advantage could be compared to other ports. This affirmation would revert to the efficiency and cost perspective linking the traditional strategic management options to the outcome of collaboration within complex systems.

This linkage between strategic management thinking and the options for business leaders that work within complex systems, where management must be exerted without formal powers, calls for further research in the context of business management. Further, the notion of hyper-collaboration and how this contributes to competitiveness needs further investigation, which has to be considered concerning the external environment. The development of hyper-collaboration may differ from the opportunities presented by surging markets compared to the risk in saturated markets. Finally, the connection between hyper-collaboration and innovation would call for further research.

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