UNIVERSITY
OF OSLO

Master's thesis

Value Creation in Knowledge-Intensive Service Firms

A case study of the role of knowledge workers in digital value creation in a data-driven shipping company

Gregor Askjer, Jørgen Stensrud

Informatics: Digital Economics and Leadership
30 ECTS study points

Department of Informatics
Faculty of Mathematics and Natural Sciences

Spring 2023

Gregor Askjer
Jørgen Stensrud

Value Creation in Knowledge-Intensive Service Firms

A case study of the role of knowledge workers in digital value creation in a data-driven shipping company

Supervisors:
Barbro Renland Haugjord
Katja Maria Hydle

Value Creation in Knowledge-Intensive Service Firms

http://www.duo.uio.no/

Printed: Reprosentralen, University of Oslo

Abstract

Digital technology changes how value creation is done in firms, and reshapes how knowledge-workers conduct their work. The focus on digitalization in firms holds great promises but has, in some cases, become a source of frustration. Firms relying on knowledge work struggle to optimize the use of digital technology in the value creation processes. Improvement of the value creation processes is important because a firm's value proposition consists of the value creation processes. Through a 17 week research project, we collaborated with a shipping company and examined how their knowledge workers (charter managers) create value in interplay with digital technology. This thesis highlights how standardizable and non-standardizable resources affect the degree a company can standardize services while still meeting customer demands. We contribute to existing theory with a standardization continuum for a better understanding of where standardization is beneficial and where human interaction is needed. Decoupling the service into company resources and activities enables managers to assess where standardization of processes is needed and where the skills of knowledge workers remain superior. Only then can digital technology be used to optimize the value proposition.

Keywords: value creation, digital technology, knowledge work, shipping, standardization, digital innovation

Preface

First and foremost, we would like to express our deepest gratitude to our supervisors, Barbro Renland Haugjord and Katja Maria Hydle, for their guidance and support throughout our project. All the discussions and feedback have been invaluable, and this thesis would not have been the same without their help.

We would also like to thank the case company for providing us with an interesting case. Thanks to the employees who took time out of their busy schedules to let us interview them. We have learned a lot about the shipping industry thanks to you!

Further, we would like to thank our fellow students on the sixth floor for engaging discussions over a coffee cup, quiz during the lunch breaks, and good vibes at Møterom . Additionally, we would like to thank Egil Øvrelid who always was up for a discussion, both academically or regarding the latest football game.

We would also like to thank our friends and family for their love and support. Jørgen would like to thank his wife, Ingrid, for her encouragement and for brightening up the project period. Gregor would like to thank his family, and his roommates Sverre and Jonas for supporting him during a challenging period.

Finally, we would like to thank eachother for a wonderful semester. Through hard discussions, constructive feedback, and long hours of hard work we have written a thesis we can be proud of. Thank you.

Regards,
Gregor Askjer & Jørgen Stensrud

Table of Contents

List of Abbreviations

AI Artificial intelligence 36, 51

AIS Automatic Identification System 9, 12, 35, 36

BMML Business model modeling languages 14

CDO Chief Digital Officer 25

CSTO Chief Strategy and Transformation Officer 23, 25

DWT deadweight tonnage 6

IoT Internet of Things 10

LLM large language models 63

LNG liquefied natural gas 6

List of Figures

List of Tables

Chapter 1

Introduction

Examining how digital technology is changing value creation is becoming increasingly important as digitalization is reshaping companies, industries, and society in general (Alstyne & Parker, 2021). Digital innovation has become a double-edged sword for value creation. On one hand, it presents unprecedented opportunities for organizations to enhance their offerings, streamline processes, connect with customers in new ways, and increase efficiency (Kohtamäki et al., 2023). On the other hand, it poses significant challenges and disruptions to traditional value creation strategies and business models (Alstyne & Parker, 2021; Osterwalder et al., 2010; Yoo et al., 2012). The rapid pace of digital innovation, coupled with its transformative nature, has created a complex landscape where organizations must navigate carefully to effectively leverage digital tools and technologies for value creation (Yoo et al., 2012). Further, companies are shifting from product-oriented business models to more service-oriented ones (Foss & Saebi, 2017). Offering services differ from offering products in several fundamental ways, as services tend to involve more customer involvement and co-creation (Sjödin et al., 2020).

The intangible nature of services, together with the increased use of digital technologies, changes how value creation is done in service companies. Value creation is a widely recognized and extensively studied concept in business model literature. It encompasses the process of combining a company's resources and activities to form a compelling value proposition for its customers (Osterwalder

et al., 2010). These resources and activities are mainly provided internally, but can also be delivered by key partners. Digital innovation makes it possible to rely more on partners for these resources and activities than before.

Increasing focus on platforms is a clear example of the externalization of resources and activities. Platforms enable new forms of value creation and redefine the nature of competition and industry boundaries (Henfridsson et al., 2018). We see that the change in the value creation processes driven by digital technologies is creating new value propositions, especially in firms that heavily rely on knowledge-intensive work. According to Alvesson (2004), knowledge-intensive work refers to jobs that involve a significant reliance on specialized knowledge, expertise, and cognitive skills.

Digital technologies provide opportunities for increased mass adaption and standardization of services (Hydle et al., 2021). The tensions between customization and standardization of services are re-shaped by digitalization, and we examine this by posing the questions: (1) *How is value creation in knowledge-intensive service firms changed by digital technology?* and (2) *How does this change affect the role of knowledge workers in the value creation process?*

To answer the research questions we conducted a case study of a shipping company, NorBulk (pseudonym), and how digitalization is changing value creation in the company. Shipping has always been heavily reliant on information to coordinate complex logistics, optimize routes, and create a competitive advantage in general. At the same time, shipping has not been among the first industries to adapt to technological developments. The digitalization wave is currently rushing in over the industry, and companies are working hard to implement digital solutions and facilitate more data-driven decisions. NorBulk uses digital technologies to help workers in the organization become more data-driven in the decision-making process but is struggling to implement these digitalization efforts across the company. Through this research project, we examine how NorBulk creates value and how digital technologies enable new options for value creation. We also examined how the limitations of digital technologies highlight non-digitizable

resources and activities, and the importance of these. Our findings were analyzed by using theorizing on digital innovation and service-oriented business models. This enabled us to identify two groups of company resources that enable value creation: standardizable and non-standardizable resources.

This thesis extends existing literature on digital value creation and service-oriented business models. Based on our findings and the chosen literature, we present an understanding of how knowledge-intensive service providers can optimize the value proposition by being aware of what resources and activities can or cannot be standardized. This further implicates the degree of customization of the service needed to meet customer demands in the industry, and how digital technology can be used to gain value from standardizable resources. Additionally, we contribute to Monteiro's (2022) theoretical framework concerning internal domain knowledge, as our research provides further insights by presenting empirical evidence regarding the unstandardized tasks executed by charter managers. These tasks play a key role in the process of value creation within the organization.

The thesis is structured as follows. Firstly, we illustrate the backdrop of our case study by introducing the global shipping industry, the latest digitalization trends in the industry, and our case company, NorBulk. Then, we review the relevant literature on business models, value creation, and how digital technologies enable new ways of value creation. Further, we describe how we collected and analyzed data in our case study. We reveal in our findings how NorBulk creates value for its customers, using a complex combination of activities and resources. Some are acquired internally, and some are acquired externally. We analyzed our findings by using theorizing on digital innovation and service-oriented business models, and we found two groups of resources that enable value creation. We further discuss how standardizable and non-standardizable resources affect the degree a company must customize a service to meet customer demands. Our contribution to the existing digital innovation literature is the introduction of the standardization continuum. This model provides a conceptual framework that places each company resource along a spectrum ranging from complete standardization to complete

non-standardization. We conclude that firms need to understand the placement of company activities and resources along the standardization continuum if they are to optimize value creation.

Chapter 2

Background

The global shipping industry is the backdrop for this case study, which is a complex industry facing many challenges, one of which is digitalization. Digitalization and extensive use of data can help companies operate more efficiently (Henfridsson et al., 2018), this increased efficiency would have huge impacts on global emissions, prices of goods around the world, and the profitability of the companies within the industry. Further, we introduce our case, a shipping company, to paint a picture of how digitalization is changing how they operate.

2.1 The global shipping industry

Maritime transport accounts for roughly 80% of international trade and is seen by Ban Ki-moon, the former Secretary-General of the UN, as the "backbone of Global Trade and the Global economy" (UN, 2016). The livelihoods of billions of people in developing countries and the living standards in industrialized and developed countries rely on the shipping industry. Shipping has been a crucial factor in the significant improvements in worldwide living standards, which have lifted millions of people out of extreme poverty in recent years (UNCTAD, 2022). Shipping is a highly globalized industry and is heavily affected by geopolitics and the world economy in general. The war in Ukraine and related fluctuations in the oil price have changed the prices, and this affects consumers around the globe.

The ships come in all shapes and forms, as they serve different purposes. This

ranges between, bulk carriers, container ships, and tankers, among others. Bulk carriers, container ships, and tankers. Bulk carriers primarily transport bulk commodities such as coal, coffee, grains, and minerals in large quantities. Tankers are specialized vessels designed for transporting liquid cargo, including crude oil, petroleum products, chemicals, and liquefied natural gas (LNG). Container ships, on the other hand, are specifically designed to carry standardized containers, which can hold a wide range of goods. A ship could also be classified as to how it is operated, either as a liner or a tramp ship. Liners operate on a regular route and follow a set schedule. Compared to tramp ships, they are built with higher power and better seakeeping qualities, making them more expensive to construct. Liners usually transport passengers or containers. However, a tramp ship, also known as a trader, operates without a fixed route and can travel to any location where suitable cargo is available. Tramp ships include all types of vessels, from bulk carriers to tankers. Bulk carriers, the ship segment that NorBulk uses, may be chartered by a ship owner to transport a particular cargo, such as iron ore from Brazil to France, and then be hired to carry coal from Britain to Indonesia. There are four different categories of bulk carriers based on how much weight they can carry, also called deadweight tonnage (DWT): Handysize (10,000–40,000 DWT), Handymax/Supramax (40,000–60,000 DWT), Panamax (60,000–100,000 DWT) and Capesize (larger than 100,000 DWT) (Kalouptsidi, 2014). This unpredictability of cargo, loading port, discharge port, and size create a complex industry.

2.1.1 The chartering process

In the shipping industry, chartering is a process where someone rents a vessel from a shipowner for a specific period of time. The person performing this process is called a charterer or a charter manager. The charter manager can own the cargo themselves, and then charter a ship to transport this cargo to the assigned destination. A charterer may also be a third party without ownership of cargo who charters/rents the vessel for a specified period from the owner and then uses the ship to carry cargo at a profit. NorBulk does the latter, as they charter a ship for

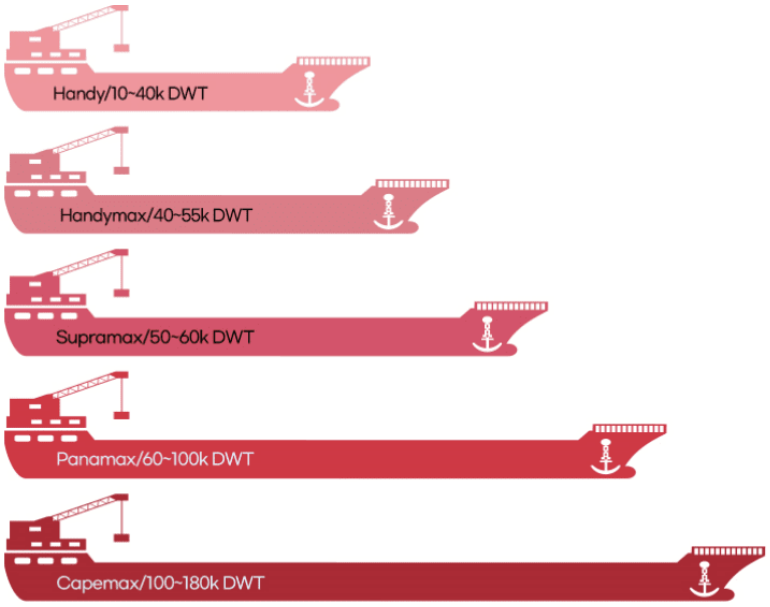

Figure 2.1: Different sizes of bulk carriers

a variable amount of time and use this ship to transport whatever goods that get them the best return on investment. The chartering process normally consists of three phases: the pre-fixture phase, the fixture phase, and the post-fixture phase (Plomaritou & Jeropoulos, 2022). The pre-fixture phase consists of investigation and negotiation. The company needs to charter a vessel and find suitable cargo, and these two are usually close to each other geographically due to the financial losses of sailing without cargo. Then the company needs to negotiate a deal that leaves them with a profit if everything goes as planned. The fixture phase consists of drawing up the contract and the parts agreeing on the terms of the deal. The post-fixture phase consists of the voyage, this includes everything between the ship's arrival at the loading port until the cargo has been discharged and delivered to the cargo owner. The risk of the journey, together with the actual service, is essentially what the customer pays the shipping company a premium for, and this can be extremely profitable at times.

2.1.2 Uncertainties: time in port and weather

Time in port is a very important variable in the bulk shipping industry, as this is the phase of the voyage with the highest probability of unforeseen incidents

disrupting the original plan. The longer a ship spends in port, the less time it has for sailing and generating revenue. Long waiting lines for loading or unloading cargo, obtaining necessary permits and documentation, and bad weather, can all contribute to extended time in port. A bulk carrier uses more time than other ships, and the loading/unloading processes are dangerous. Handymax vessels spend approximately 74 hours, and Panamax vessels spend approximately 120 hours in port. This is significantly longer compared to the average of 12 hours spent in port for container ships (Alderton & Lane, 2001).

Weather is one of the biggest uncertainties within the bulk market, both when it comes to loading and unloading operations in port and during the voyage. Some cargoes, like grain, are very sensitive to rain and require dry weather when handled. Bad weather conditions can result in extra days in port because the loading/unloading operation is impossible to complete. Weather is also a very important factor when planning the voyage, as winds, waves, and currents determine how efficiently the voyage can be executed. The variation in crossing the Atlantic Ocean, whether under calm weather conditions or during a storm, can result in a difference of several days.

All of the above-mentioned attributes of bulk shipping create a complex and highly competitive industry. The use of digital technology is increasingly seen as a solution to minimize and eliminate some of the complexity (UNCTAD, 2022). Digital technologies enable shipping companies to better manage their fleets, optimize routes and cargo, monitor vessel performance in real time, and streamline communication between vessels and ports. It can also bring a competitive edge in knowledge-intensive work. In this thesis, we examine how these possibilities are changing the industry.

2.2 Digitalization in shipping

Digitalization has changed multiple aspects of society drastically in the last decades, but the digitalization of the shipping industry has not followed the same pace. However, the last years have shown that digitalization is slowly being

accepted as a requirement for maintaining or gaining a competitive advantage in the industry. According to a survey conducted by the International Chamber of Shipping and BIMCO in 2020, about 80% of ship operators reported having a digitalization strategy in place, up from 65% in 2019 (International Chamber of Shipping and BIMCO, 2021). We highlight three emerging trends caused by digitalization: democratization of data; data-driven chartering; and smarter ports.

First, democratization of data is one of the developments in the shipping industry that fuels digitalization. Automatic Identification System (AIS) data is a global and standardized communication system that enables sharing of a ship's position and voyage history. The default transmission rate is every few seconds, and the message includes automatically updated data on ships' identity, position coordinates, course, and speed. In addition, the message carries manually entered (and more static) data such as cargo, point of departure, destination, and estimated time of arrival (Grønsund & Aanestad, 2020). This has many use cases for shipping companies and has been an important source of information. The use of AIS data ranges all the way from piracy monitoring to commodity trading and intelligence. However, the system has several issues with poor and varying data quality. The data has problems in crowded waters, as AIS signals may interfere with one another. Manually entered data, such as a ship's destination, is vulnerable to omission, misspellings, and distortions. For example, the destination port can be spelled in multiple ways (e.g. "Singapore" or "Sng"), reducing the quality and reliability of the AIS data (Grønsund & Aanestad, 2020).

Second, the shift towards data-driven chartering is another development that is changing how shipping companies operate. Data-driven chartering uses data analytics and machine learning techniques to make informed decisions when chartering ships. This involves collecting and analyzing various types of data, such as vessel performance, market trends, weather patterns, and port congestion, to identify the most suitable vessels, routes, and timeframes for a specific cargo. These digital tools help charter managers to minimize risk while ensuring the profitability

of a deal.

Third, increased digitalization has fueled the transition to smarter ports in the shipping industry. A smart port is a term used to describe a port that is automated and uses Internet of Things (IoT) technology to collect data from all stakeholders in real-time. The key infrastructure of a smart port consists of a network of smart sensors, wireless devices, and data centers, enabling port authorities to provide essential services more efficiently and in a faster manner (Yang et al., 2018). The port of Rotterdam is Europe's biggest port, but is also the smartest, due to extensive investments in digitalization. Port of Rotterdam is envisioned to develop into an extensive digital platform that directs transport movements in the port area – without operating a single warehouse, train, or ship of its own (Port of Rotterdam, 2023). While some large and busy ports have embraced digitalization to enhance their operations and become smarter, it is important to highlight that the majority of ports worldwide still lag behind in terms of adopting smart technologies and processes.

The combination of accelerating digital focus, the magnitude of the industry, and the potential rewards of digitalization is highly relevant for this master thesis.

2.3 NorBulk - the case

One of the companies that are attempting to be early on the rising digitalization wave in shipping is our case company, NorBulk. NorBulk is a global dry bulk operator and charterer, and they operate a fleet of 100-150 bulk carriers in different sizes. NorBulk's business model is to efficiently match cargo with vessels to create an optimal transportation service. Norbulk does not own any of the vessels that they manage but leases ships based on market conditions. Leasing can be for one voyage or for a larger period of time. They also focus on identifying potential cargo to optimally utilize these ships. Both of these activities depend on significant use of information to find the deals with the highest return on investment.

NorBulk was founded in 1982, the headquarter is located in Oslo, with a strong

global presence with offices in Singapore, Dubai, Santiago, and Casablanca. The company has delivered strong results in the last years and reported a net profit of USD 66 million in 2022. This is impressive, given that NorBulk only employs 118 people. NorBulk operates with a flat and decentralized organizational structure, which enables quick response to local market changes. NorBulk is organized into eight commercial teams based on the different geographical areas or vessel segments. All teams have a lot of individual freedom in the operation phase due to the high level of variety of each segment. For instance, the market in the Baltics is very different from the market in South-East Asia.

NorBulk's business model of connecting cargo to vessels heavily relies on knowledge and information. Having a deeper and wider understanding of the market than their customer enables them to be profitable. This information asymmetry between NorBulk and the customer has traditionally been the biggest driver of profits for NorBulk and similar companies. This is because a large difference in market information provides NorBulk with a bigger negotiation space, and this usually results in a more lucrative deal for the charterers. An example from our case is how a chartering manager ended up doing very profitable business by sending five ships with rocks from a small quarry in western Norway to the Philippines. He got contacted by someone in his network and was asked if he could arrange the shipment of these rocks to South-East Asia. The owner of the cargo rarely used this kind of service and was not updated on the freight rates, but wanted to get this done as soon as possible. The asymmetry in market knowledge between the charter manager and the customer left the charter manager with a lot of negotiation space. This resulted in a very profitable deal for the shipping company, while the customer got the service they wanted.

In recent years, information technology has been seen as a solution to optimize data collection, and further analyze this data to increase the information asymmetry. Senior management in NorBulk saw the potential information technology could have on the company and invested in the development of new systems. They hired experienced IT workers to accelerate this transition, and from 2017 to 2022 they

moved all on-premises systems to the cloud. Further, they built data platforms and data lakes to collect the data they needed to make more well-informed business decisions. They started to buy data, for instance AIS data, and tried to develop internal solutions to contextualize and shape the data. NorBulk quickly realized that this was a bigger task than they initially thought and recognized that they did not have enough developers and data scientists to extract the potential value from the data. This resulted in a shift in their digitalization strategy as NorBulk started to subscribe to platforms that did this better than they could internally. Getting access to large datasets and algorithms trained on data from many shipping companies proved valuable for NorBulk and enabled them to make better decisions. However, this sharing of data has increased the overall level of information, and the general knowledge differences in the industry have flattened out. This is a natural development as many of NorBulk's competitors also use the same datasets and algorithms provided by the platform.

Most of the digitalization in NorBulk, especially the collection and use of data, is done to improve the decisions of the chartering managers. The chartering managers are NorBulk's most important asset, since they are responsible for most of the value creation in the company. A chartering manager was previously heavily reliant on personal experience, self-acquired information, and gut feeling when making business decisions. This created a lot of personal freedom in terms of how charter managers conducted their work. The chartering manager role has long traditions and has historically been regarded as a prestigious profession. Chartering managers need to be available round-the-clock due to the globalized nature of the industry. The compensation package for chartering managers is often very good, and they are normally paid based on their performance. Management in NorBulk has invested in data-driven tools for the chartering managers, but the culture of individuality remains. This results in a variety of usage patterns when it comes to how these platforms and tools are used, and this is a source of frustration for the tech developers and management.

Thus, NorBulk is actively working to become more data-driven in their business

decisions. Due to the nature of the industry, NorBulk's internal structure, and the history of the charter manager role, this is challenging. At the same time, NorBulk sees that digital technology will change the value proposition of companies in the shipping industry. The value creation processes in NorBulk are changing, and we turn to literature to understand the implications digital technology has on value creation.

Chapter 3

Related Literature

Theorizing on business models combined with digital data, form an understanding of how digital technology and business models work together to create value. We first build an understanding of business models and value creation in service firms. Secondly, we make an understanding of the properties of digital technology and its implication for value creation.

3.1 Value creation in service firms

A business model is a conceptual framework that explains the process of how a company creates, delivers, and captures value. It encompasses the critical elements and actions that constitute a company's operations, along with its revenue and profit generation mechanisms. Business models are used to examine and enhance a company's operations, identify potential areas for expansion and innovation, and convey its value proposition to customers, investors, and other stakeholders (Osterwalder et al., 2010). Focusing on business models is important because this highlights the often overlooked yet essential parts of creating a successful business. It is common to overanalyze the characteristics of the product/service the company is offering and forget about how, why, and to whom this product/service shall be offered (Chesbrough, 2010).

Business model modeling languages (BMML) aims to highlight all of these dimensions of a business. The most used and acknowledged modeling language

is Osterwalder´s Business Model Canvas (Figure 3.1), and this has, in many ways, shaped the research landscape around business models. This model emphasizes the four main components of a business model: value proposition, value creation, value delivery, and value capture (Peters et al., 2015).

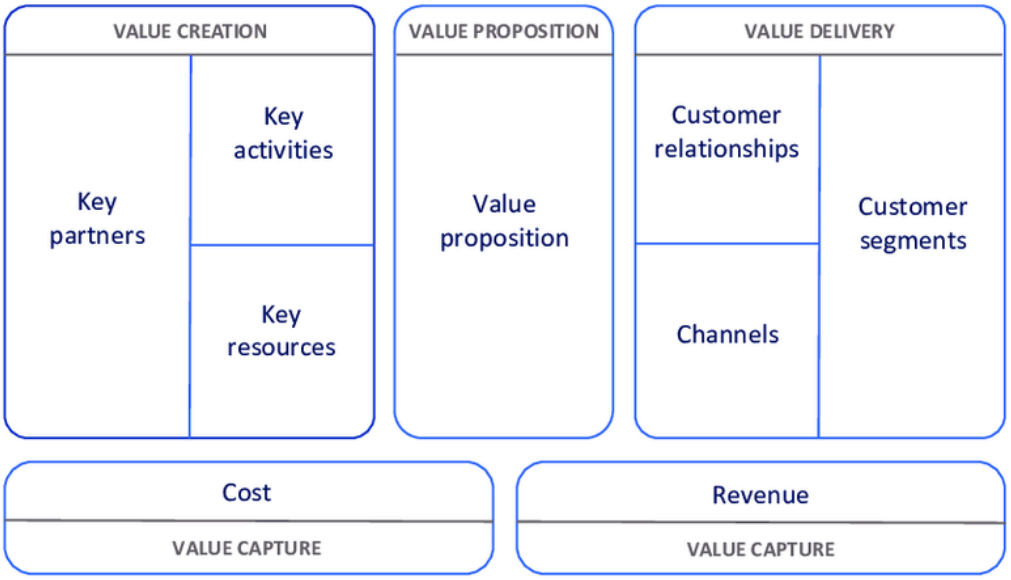

Figure 3.1: Business Model Canvas

At the core of the Business Model Canvas lies the value proposition, which represents what product/service the company offers to satisfy the customer's needs. A strong value proposition increases customer attraction and retention as this communicates the benefits and value of the product/service (Chesbrough, 2010). Value delivery refers to the process of delivering value to the customer, including the necessary structures and channels to provide this value. Value capture describes how the company can monetize the value created and generate revenue from the value proposition. This includes defining the cost structure and the revenue streams of the business.

Value creation is the key activities and resources of a company, and how these are provided internally or through key partners (Osterwalder et al., 2010). The combination of these creates the value proposition that is offered to the customer. More recent literature defines value creation as the processes aimed at increasing value generation (Chesbrough et al., 2018). The value creation theory is constantly

in motion as business models change from product-oriented to more service-oriented (Aas et al., 2020; Foss & Saebi, 2017). Value creation in service companies differs from that of products due to the intangible nature of services. Services rely on value being co-created by the provider and the customer, with simultaneous provision and consumption (Hydle et al., 2021). Services depend on a certain level of customization to meet customer demands, and customization of the offering is seen as a key value creation process (Garcia Martin et al., 2019; Hansen et al., 1999). The services our case delivers are knowledge-intensive, involve a high degree of customization, and require substantial interaction with the client (Alvesson, 2004; Løwendahl, 2009).

The increased use of digital technologies changes the value creation processes and drastically changes how company resources and activities are orchestrated. The partners become increasingly important as resources change from being acquired externally rather than internally (Alstyne & Parker, 2021). This change makes it increasingly important to be aware of where the resources are acquired and where the activities are performed. Our case showcases this externalization of data and how digital technologies are disrupting the traditional value chain. That is why we look into how digital technologies changes traditional value creation in knowledge-intensive work. Thus, we primarily focus on the last dimension of the Business Model Canvas: value creation.

3.2 Digital value creation

In today's rapidly evolving digital landscape, firms are experiencing significant transformations due to the proliferation of pervasive digital technology and the fundamentally different characteristics of digital data, which in turn enable a new way of value creation in today's digital world (Alaimo & Kallinikos, 2022; Alaimo et al., 2020). Digital value creation and digital innovation rely on encoding real-life actions or converting traditional tokens. This can be numbers, texts, or pictures converted into strings of 0s and 1s, which computers can process—also called digitization (Alaimo & Kallinikos, 2022; Yoo et al., 2010). To better understand

digital value creation, we examine the unique characteristics of digital data and its impact on digital innovation. By examining these changes, we can better understand the evolving landscape of digital innovation and its implications for value creation.

Data is found to be non-neutral; Gitelman (2013) states that data "is already 'cooked' and never entirely raw." This means that data is not completely neutral and cannot be interpreted in isolation. When transformed into digital bits, analog records become heavily influenced by the methods, procedures, and technologies applied to transform the data (Monteiro, 2022, p. 73). The design decisions shapes and interprets the data. And as a result, data cannot be considered neutral since these former design decisions are closely tied to the path dependence of technologies, beliefs, organizational goals, or physical limitations (Alaimo & Kallinikos, 2022, p. 25)

Zuboff (1985) introduced the terms "automate" and "informate" as a way of distinguishing digital technology from general technology. While all technology can automate, it is the unique capability of digital technology to informate that sets it apart. This is because digital data, serving as both input and output, can be indefinitely represented at no additional cost. Informating refers to the process of converting descriptions and measurements of activities, events, and objects into information that humans can utilize for decision-making. On the other hand, automating involves using technology to automate tasks and replicate human skills (Hydle et al., 2021). Zuboff (1985) was also an early pioneer in recognizing and understanding the challenges associated with the widespread use of digital representation. In her work, she discovered that data tokens, which encoded the physical processes, were associated with various challenges. For example, as Alaimo et al. (2020, p. 17) illustrates, the data traces resulting from actions like "liking" on Facebook may have the intention of representing real-life behaviors like approval, consent, or preference. However, they ultimately encode behaviors defined by the platform itself, which is a separate thing.

Another example of recognizing the contested nature of data and its representation

comes from Monteiro (2022). In his book "Digital oil," Monteiro 2022 studies an oil and gas company's monitoring of the marine Arctic environment using various digital technology and sensor technologies to scan the subsurface of the sea for oil basins. The study shows that it is very rare for data exploration of the subsurface to produce unambiguous indicators of the location and size of oil basins, and this is in a heavily physical context with sensor data. This study also highlights the close relationship between users and digital technologies. The empirical findings emphasizes the important role of "data managers" who possess expertise from previous projects, internal domain knowledge, and strong relationships with close partners. These factors are essential for overcoming data limitations and ensuring its effectiveness. The subsurface data and what it represents are heavily contested and discussed between geologists, data scientists, and the Norwegian state as key economic stakeholders. For the oil company, accurate data representation holds paramount importance as it directly translates into economic value (Monteiro, 2022).

Another important characteristic of digital data is its homogenizing capacity (Yoo et al., 2010). The increasing translation of cultural codes, conventions, and diverse information processing systems into strings of 0s and 1s enable the homogenization of knowledge and knowledge making (Yoo et al., 2010). Homogenizing shrinks the distance across different knowledge and industry domains, making it easy to exchange and cluster data together with different types of data. These formats can be easily manipulated, stored, processed, shared, and combined, enabling new forms of innovation (Alaimo & Kallinikos, 2022, p. 25).

The homogenizing and standardized format of data unlocks other core data qualities, such as editability, portability, and recontextualization ability. Editability means data can be modified through aggregation, filtering, reordering, and expansion. Portability refers to transferring data through common standards of structuring and sharing information. Lastly, recontextualizing is the capacity to combine ground truth data with local knowledge and expertise (Alaimo et al., 2020, p. 9).

Moreover, the homogenization and standardization of data contribute to two noteworthy transformations in digital innovation as highlighted by Yoo et al. (2012, p. 1400): (1) The increasing significance of digital technology platforms; and (2) the widespread practice of combinatorial innovation. These transformations reflect the dynamic nature of digital data and its impact on digital innovation. By examining these changes, we can better understand how value creation in knowledge-intensive work is changed by digital technology.

First, one of the most significant ways innovation processes and outcomes have changed is the increasing importance of platforms as a central focus for innovation (Yoo et al., 2012, p. 1400). Henfridsson et al. (2018) argues that platforms enable new forms of value creation and redefine the nature of competition and industry boundaries. One of the key characteristics of digital technology platforms is their ability to act as digital infrastructures that connect different actors, such as users, producers, and intermediaries, by providing a shared set of resources and capabilities (Yoo et al., 2012). This connection can facilitate distributed and combinatorial innovation by allowing different actors to recombine digital resources in new ways (Henfridsson et al., 2018).

Another perspective on platforms is how the widespread adoption and usage of digital tools and components has led to firms building platforms not only containing products but the digital tools, components, and digital capabilities of the firm (Yoo et al., 2012). One example is sizeable complex information systems, such as enterprise resource planning systems, allowing firms to design and control multiple products or subsystems using the same digital tools, in contrast to the past, where diverse resources required different tools (Yoo et al., 2012). The emergence of digital technology platforms has enabled new forms of value creation and impacted innovation processes and outcomes, such as recombination.

Secondly, recombination creates value by connecting digital resources in new ways that generate novel outcomes or solutions. Henfridsson et al. (2018) argue that recombination in digital innovation creates an open-ended value landscape, where the value of a specific digital resource is not fixed but fluid over time,

depending on how it is connected to other resources and how different actors use it. According to Arthur (2009), the nearly limitless recombination of digital data has emerged as a novel driver of innovation. To better understand the value creation in digital innovation through recombination, Henfridsson et al. (2018) differentiate between two types of recombination: recombination by design and recombination of use.

Recombination by design is the process of generating value by connecting digital resources as a value offer to users. This typically involves firms designing and developing new products that leverage the capabilities of these recombined resources. For example, Spotify is a product that, by design, recombines music streaming, social networking, and recommendation algorithms to offer a personalized music experience to users. Recombination of use refers to the process of generating an individual value path by using existing digital resources in new and innovative ways. Individuals and firms do this by combining different software and services as they want. For example, a user can recombine Google Drive, Microsoft Office apps, and LaTeX to create a cloud-based office suite that suits their needs. Recombination is a key concept for understanding how the unique characteristics of digital data, are unlimited reuse, cross-border sharing, and aggregating, create value.

The literature chapter reviewed the relevant literature on business models, value creation, data, and digital innovation. We examined how digital technologies enable new forms of value creation by transforming data into standardized formats that can be recombined and shared across platforms. Additionally, we also explored the challenges and limitations of data standardization and representation and the importance of internal domain knowledge. The literature chapter provided a theoretical framework and a set of concepts to analyze the case of NorBulk, a shipping company that uses digital platforms and tools to improve its decision-making and operations. The next chapter aims to provide a detailed account of the research approach, data collection, and data analysis employed to gather empirical data and analyze the case.

Chapter 4

Method

4.1 Research approach

The research conducted in this thesis is based on a qualitative research study that followed the case study approach (Yin, 2018). The thesis is a single case study of an international shipping company, NorBulk. The case was chosen through an external contact, and fieldwork was conducted from January to March 2023. The researchers communicated their roles and intentions effectively during fieldwork and obtained informed consent from all participants for observations and interviews. Our research approach was inductive, collecting- data through qualitative interviews, and data collection before analyzing the data to identify patterns and themes to further explore.

4.2 Data collection

Case study research is characterized by its in-depth exploration of a phenomenon within its real-world context (Yin, 2018, p. 172). Recognizing the importance of depth and context, our study employed two methods of data collection and drew from multiple sources. This also served as data triangulation (multiple data sources) and methodological triangulation (multiple methods). Documents served as a valuable means of gaining contextual information over time, while interviews constituted the primary source for conducting in-depth examinations. This approach allowed us to have a thorough and comprehensive understanding of

the use of digital technology and its implications for value creation.

4.2.1 Interviews

Considering that qualitative studies aim to provide a deeper understanding and insight into the subject being investigated, the process of data collection is influenced by the individuals who are being interviewed (Thagaard, 2018). Given our objective to comprehend the utilization of digital technology and value creation within a shipping company, our study primarily focused on the users of these systems, specifically charter managers. To get a comprehensive perspective on the topic and to triangulate our data (Oates et al., 2021), we strived to conduct interviews with a diverse sample of charter managers from different teams and different levels of experience and expertise.

The interview protocol was developed through a collaborative process involving a thorough literature review, consultations with our contact person at NorBulk, and an industry expert. Several iterations were made to refine the protocol and ensure its effectiveness.

With an inductive approach, we wanted the data to guide our processes and interviews. Therefore, we selected semi-structured interviews where we asked open-ended questions, encouraging interviewees to share their stories and dive deeper into each subject (Oates et al., 2021). This approach allowed us to gain a better understanding of their day-to-day operations. Semi-structured interviews allowed us to engage with the interviewees in a less constrained manner, which further enabled us to capture unforeseen phenomena during the research process. We asked follow-up questions to dive deeper into each topic and encouraged participants to elaborate on their answers. The interviews were audio-recorded for the purpose of transcribing them at a later stage. We also took notes during the interviews to ensure that all relevant information was captured (Oates et al., 2021). To ensure confidentiality, the informants were made anonymous.

Interviews with NorBulk

We began the interview process by speaking with the company's Chief Strategy and Transformation Officer (CSTO), who in turn introduced us to a business developer in charge of implementing one of the platforms we were going to explore. They were curious about how a particular service affects the firm's value creation. They wanted to find out the most effective approach to encourage users to adopt the new system, and what kind of value this would offer. We believed it would make an interesting master thesis and started the iterative approach of finding related literature.

In the first interviews, we gained an understanding of the company and the industry, followed by a more detailed technical system interview with the business developer. The business developer also acted as our contact person in the company. He assisted us in scheduling interviews with the people we wished to speak with, reviewed our interview guide, and provided us with internal documents and pre-recorded interviews. As a middle manager involved in the implementation of a technical platform, he was also a valuable interview subject. The combination of the initial interviews and the pre-recorded interviews helped us design a relevant interview guide we could later expand on.

After an introductory phase at NorBulk, we received a pre-recorded interview that served as a starting point for our research. This initial interview focused on a specific platform, where the platform provider explained its mechanics, including the prediction algorithms and data sources utilized.

Before conducting interviews with the charter managers at NorBulk, we were also provided with two pre-recorded interviews conducted by the consulting firm "EY" in 2020. These interviews featured two charter managers discussing their day-to-day operations and the system they used. The pre-recorded interview was part of a bigger review of NorBulk's day-to-day system. These pre-recorded interviews provided us with valuable insights and a deeper technical understanding of the industry and the various actors we would interview later. Since we had limited time with the interview objectives, this was a significant advantage. It allowed us

to move beyond trivial topics as day-to-day operations and gain more valuable insights from the interviews.

We also got two additional pre-recorded interviews on a different role interconnected with the charter managers to overall better understand the shipping flow from start to finish.

In addition, we obtained two extra pre-recorded interviews that focused on a different role closely interconnected with charter managers. These interviews helped us get a holistic understanding of the shipping process from its inception to its completion.

Table 4.1: Overview of pre-recorded interviews

Qnt.	Data source	Time	Participant(s)	Content
1	Video interview, pre-recorded	60	Platform team and NorBulk	Introduction video to weather platform
2	Video interview, pre-recorded	55	Charter managers at NorBulk	Review of day-to-day of charter manager
2	Video interview, pre-recorded	55	Vessel operators at NorBulk	Review of day-to-day of vessel operator

In parallel with the interviews, we engaged in relevant literature and held discussions with an expert in the industry. This process revealed emerging phenomena that shifted our research focus. Together with NorBulk, we decided to broaden our perspective beyond a specific platform and instead examine the broader use of digital technology and platforms in general, as well as the industry trend toward data-driven decisions. This renewed focus influenced the structure of our interview guide and the questions we posed in the remaining interviews.

Given our primary focus on NorBulk's platforms, we specifically targeted one group of users for our interviews: charter managers. Consequently, we conducted four interviews with different charter managers with varying lengths of experience within the company and reviewed two pre-recorded interviews with to other charter managers. We felt we had a satisfying saturation and exploration of data after four

interviews plus two pre-recorded interviews, and we then continued to interview the Chief Digital Officer (CDO) to gain insights into their understanding, discussing overall strategic questions and validating our preliminary findings.

Table 4.2: Interviews at NorBulk

Role	Time in the Company	Date	Duration
CSTO	19 years	23/01/2023	30 min
Business Developer	4,5 years	23/01/2023	30 min
Business Developer	4,5 year	02/02/2023	45 min
Charter Manager	5 years	09/03/2023	50 min
Charter Manager	2,5 years	16/03/2023	25 min
Charter Manager	2,5 year	16/03/2023	20 min
Charter Manager	21 year	16/03/2023	50 min
Data Scientist	4 years	16/03/2023	25 min
CDO	5,5 years	28/03/2023	50 min

When interviewing the CDO, we used a different approach, since the interviewee had a different insight and position than the other interviewees and could reflect and comment on the key topics. We used a more open interview approach where we presented our identified key topics and learnings from the interviews, and discussed and explored these key topics together. This enabled us to get a deeper understanding and also enhance the credibility of the data, as we could get a more nuanced and detailed understanding of the key topics.

4.2.2 Document analysis

During the data collection phase, we performed document analysis as part of our research approach. Our initial objective was to comprehensively understand the context and industry, ensuring we were well-informed before engaging with the informants. To achieve this, we dedicated time to reading and collecting company-specific web and newspaper articles as well as public company reports and podcasts, enabling us to get a clear picture of the company and how they have evolved over time. We also read industry-specific research papers to better understand the industry and assess the company compared to its competitors, and gain insights into industry trends. In addition, we obtained internal documents

that detailed the different platforms used by NorBulk and their respective roles. This preliminary information helped us familiarize ourselves with the platforms and systems that would be the focus of our following interviews. This approach allowed us to identify relevant interview questions and situations to observe during our research.

Table 4.3: Overview of data sources

Data sources	**Quantity**	**Information about**
Academic Articles	10	Industry
Academic Articles	8	Digitalization
Internal reports and presentation	3	Company
Web and newspaper articles	8	Industry and company
Company annual reports	2	Company
Podcasts	2	Digitalization and company
Pre-recorded interviews	5	(See Table 4.1)

We followed the procedure recommended by Yin (2018, p. 160), treating the document analysis as a continuous process throughout the case study, adapting and refocusing as we gained a deeper understanding of our research. As our case study progressed, we developed a clearer sense of what information was most relevant and significant to our investigation. The documentation played a crucial role in our case study as a way of corroborating, augmenting, and triangulating evidence from other sources (Bowen, 2009; Yin, 2018) to provide 'a confluence of evidence that breeds credibility' (Eisner, 2017, p. 110). This enabled us to focus on the most relevant documents and extract valuable insights aligned with our research objectives.

4.3 Data Analysis

The data analysis in our study has been a continuous and parallel process alongside the data collection. Following each interview, we transcribed the recorded conversations using the University of Oslo's speech-to-text service, "autotext." While this automated process was generally adequate for most of the interviews, there were certain sections where we had to transcribe the content for accuracy

and completeness manually. We analyzed the transcribed data and reviewed and discussed emerging topics in our literature research, which helped us divide the findings into related themes early.

After conducting the nine interviews, we conducted a detailed analysis of the interview data. Building upon the emerging themes from the interviews, we employed coding techniques to uncover additional insights and determine if these aligned with the identified themes. We carefully documented relevant quotes from the transcribed interviews and organized them into suitable thematic categories. After this step, we ended up with data that were grouped into five categories, which later were reduced into four subheadings within our findings. These categories emerged throughout the simultaneous data collection and literature research processes and were influenced by our theoretical perspective, particularly the literature on digital value creation and business models.

Since one of our focuses was to examine how digital technology affected the role of knowledge workers in the value creation process, we wanted to interview charter managers. We found it essential to understand charter managers' decision-making process and when they choose to utilize digital technology, as well as when they choose not to use digital technology. To achieve this, we reviewed our internal and external documents and then tried to map our charter managers' decision-making process. We found it helpful to divide communication into two categories: relationship-based and platform-based. The blue/green is relationship-based communication, and the red is platform-based communication.

This process made it evident that charter managers rely both on platform-based communication and relationship-based communication for their operations. In situations where platform-based communication is not feasible, they resort to relationship-based communication using existing and established contact persons, which we label relationship-based communication, particularly during negotiation, but also in the estimated phase. In some situations, charter managers could use platform-based communication and relationship-based communication complementarily. For instance, during the initial phase, they often use platform-

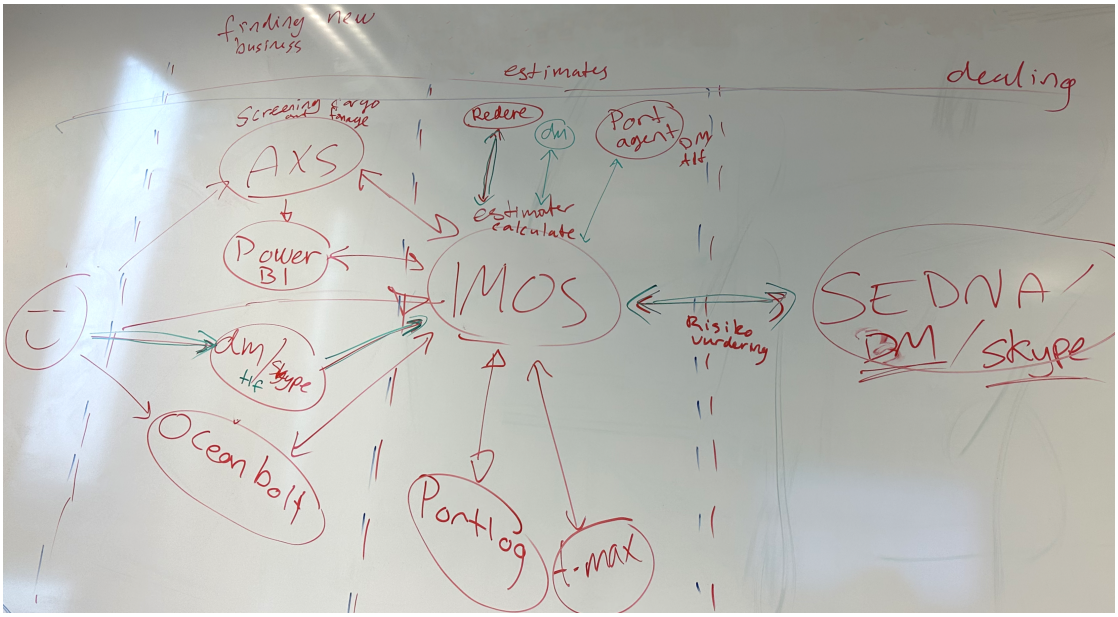

Figure 4.1: The decision process of a charter manager

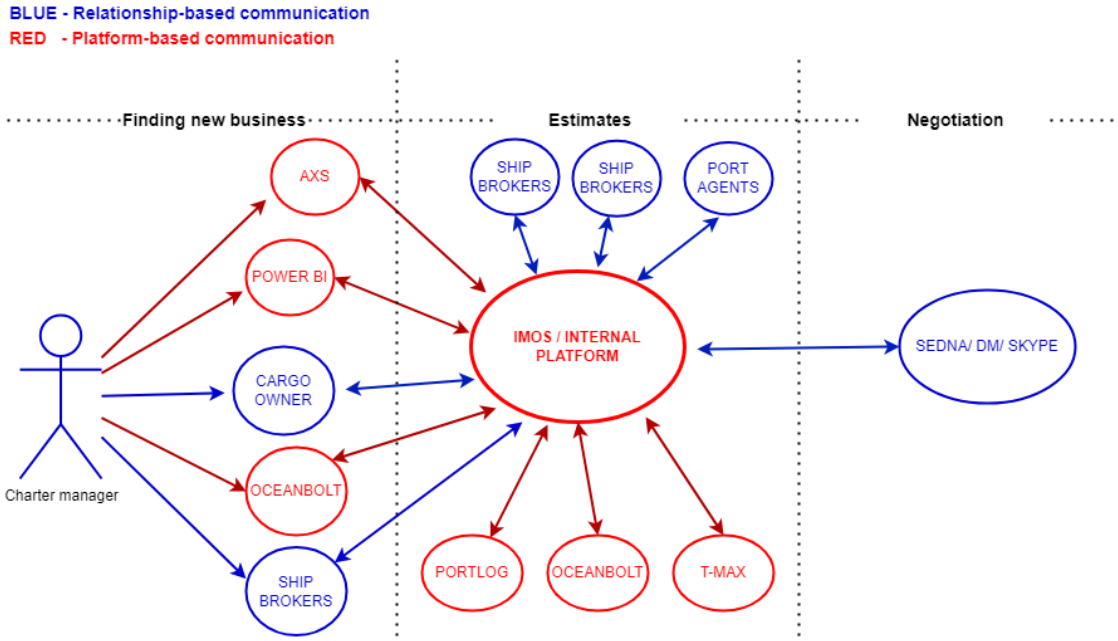

Figure 4.2: The decision process of a charter manager digitized

based communication to obtain estimates. However, if they encounter a scenario where the platforms cannot provide the expected answer, they may resort to sending direct messages to relevant contacts. Going through this figure multiple times helped us understand their complex decision-making process.

4.4 Research Quality

Research quality is crucial in any study, particularly in case study research, which is often criticized for its lack of rigor and validity (Gibbert et al., 2008). Research quality refers to the extent to which the research design, data collection, data analysis, and reporting are conducted in a systematic and transparent manner that ensures credibility and trustworthiness.

4.4.1 Validity

Validity refers to the accuracy and credibility of the research findings and conclusions. In qualitative case studies, validity can be threatened by various factors, such as interviewer bias, or poor data quality (Eriksson & Kovalainen, 2008; Yin, 2018). In the following section, we elaborate on how we addressed some potential threats to validity.

Interviewer bias refers to the possibility that the interviewer may influence the responses of the participants by their behavior, tone, attitude, or expectations. (Yin, 2018). To minimize this threat, we adopted a two-interviewer approach. One interviewer asked the questions while the other observed the non-verbal signals of the participants and took notes. This helped reduce the influence of any individual interviewer and increased the reliability of our data. We compared and discussed our notes and observations after each interview to ensure consistency and resolve any differences (Oates et al., 2021).

Other ways of enhancing the validity of the study are to use multiple methods as a way of triangulating and member check. We collected and compared data from different types of generated data as documents and interviews (Section 4.2). Since the data showed consistency across the different sources and methods we

used, this gave us confidence that the data was not too much linked up to the method we used (Oates et al., 2021; Yin, 2018). This made us able to develop a comprehensive understanding of the empirical material as well as corroborate and validate the findings. Furthermore, the use of direct quotes in the findings and the comprehensive description of our data collection process were employed to portray a clear and logical process in our thesis. These efforts aimed to strengthen the connection between the data, research questions, and, ultimately, the conclusions through the establishment of a chain of evidence (Yin, 2018). We also performed a member check by feeding our interpretations and findings back to the participants. This helped us validate our interpretations and findings, as well as a means to enhance the credibility and quality of the data (Eriksson & Kovalainen, 2008).

4.4.2 Reliability

Reliability refers to the extent to which the operations of the study can be replicated and achieve consistent results (Yin, 2018). However, opportunities for repeating a case study rarely occur. Qualitative case studies are complex and dynamic phenomena that are influenced by many contextual factors and variables that may change. Moreover, case studies often rely on qualitative data that are subject to different interpretations and perspectives by different researchers. Therefore, it may not be easy to achieve a high degree of agreement or consistency among different researchers who conduct or analyze the same case study (Eriksson & Kovalainen, 2008).

However, Yin (2018) argues that it is still important to position the work to reflect concern over reliability. Considering this, we have developed a case study database that includes all the relevant documents, meetings and personal notes, as well as the raw interview data. This was a way for us to conduct research like someone was looking over our shoulders. To ensure the confidentiality and privacy of the participants and sources involved in the case study, we have anonymized these notes. As a result, the database can be made accessible to other researchers or reviewers who wish to examine or verify the evidence and findings of the case

study, as Yin (2018) suggests.

We also used other strategies to enhance the reliability of the study. Firstly, we utilized audio recording and transcription methods to ensure the accuracy and completeness of the data. This allowed us to capture and analyze the information with precision.

Additionally, we documented the steps and decisions made throughout the research process, demonstrating how the data were collected and analyzed. This approach increased the transparency and accountability of both the research process and the resulting findings. Furthermore, we pursued external input by inviting a researcher in the field, as well as our supervisors, to discuss the findings, theoretical frameworks, and analysis. This further augmented the transparency and accountability of our research process.

By adopting these practices, we aimed to improve the reliability of the study (Yin, 2018)

4.5 Ethics

For this master thesis, we acquired permission from NSD (Norwegian Centre for Research Data) to conduct the research. Hence, we sent an information document to the informants before each interview (see appendix B) that explained the interview process and the data management. The document included an introduction of the researchers, the research purpose, and some important points about how the interview would be conducted. We emphasized that participation was voluntary and could be withdrawn at any time. To keep their identities confidential, we used the least amount of personal details and assigned fake names to participants. We avoided naming public organizations since it wasn't necessary for the research and context. By excluding such information, we aimed to reduce the possibility of identifying individuals.

In this chapter, we have described our research design, data collection, and data analysis methods. We have employed a qualitative case study approach to

investigate the value creation of digital technology in knowledge-intensive works. This approach allowed us to gain valuable empirical insights specific to NorBulk. Throughout this process, we conducted a simultaneous exploration of relevant research literature and empirical data. In the following chapter, we will present the findings that have emerged from this described research process.

Chapter 5

Findings

This chapter presents the empirical findings discovered through the process of data collection and analysis. Based on our data collection and analysis, we have identified four significant findings related to value creation in NorBulk. The first finding explains the transition from traditional shipping to data-driven shipping. Second, is the lack of standardization in the chartering process. Further, the third finding is regarding how data is used to get a competitive advantage. Lastly, we will present the everlasting importance of business relationships.

5.1 From traditional shipping to data-driven shipping

Shipping has always relied heavily on information, and the company with the most accurate information has had a competitive edge. In a global industry with natural information asymmetry, this advantage has proven to be profitable, provided the company has better access to data than its competitors. How this information has been collected has remained the same for many decades, but the emergence of digital tools has changed this drastically. The emergence of platforms and rich datasets is currently changing how shipping companies gather information, and how they work. One charter manager highlighted this by explaining how his day-to-day work has changed:

> I used to talk for several hours on the phone every day to gather

> information and negotiate deals. Now I have around 15 short [2-minute] calls a day.

Especially chartering managers have changed how they work. They used to be on the phone with potential clients all day and traveled worldwide to maintain good relationships with their network. A successful charter manager needed to know the market in and out, from cargo prices to bunker prices. They also needed to have an opinion of the weather history in for instance southern China if that was where the ship was loading. Based on these assumptions and experiences, the charter manager would offer a price to the customer, and if that price seemed reasonable to the customer, they went forward with the deal. The knowledge asymmetry between the customers and the shipping companies was, and still is, the biggest driver of profits in the industry.

The shipping industry is not known to be the most innovative and explorative industry. Many companies have yet to start their digitalization "journey", and the level of digitalization is highly varying within the industry. NorBulk is trying to be data-driven and gain a competitive edge over the competitors that are still lagging behind in terms of digitalization. A data scientist we interviewed highlighted the differences in the industry:

> The industry is very old-fashioned. It was not long ago people used fax machines.

At the same time, it is important to highlight that chartering managers still spend a lot of time communicating with port agents, potential customers and others. NorBulk believes that this will still be important going forward, but that they need to be given the best possible data to optimize these interactions with humans. A C-level executive explained the importance of data:

> As the world becomes more efficient and people become smarter, margins decrease, and effectively using data becomes a competitive advantage.

NorBulk emphasizes that collecting and using data has always been important,

but the flow and availability of data have changed dramatically in the last two decades. This change resulted in many different software systems that helped separate parts of the company. This became a problem internally and the silo-systems made it difficult to collaborate within the organization. Therefore, it became important for NorBulk to create and acquire systems that made internal collaboration possible. An example of this is a software platform that functions as an advanced spreadsheet, enabling charter managers to generate more precise estimates by utilizing multiple data sources. Operations also use this platform to follow up the fixed journeys, thus making the process smoother. A C-level executive of NorBulk describes this as a result of its digital strategy:

> Once we had the necessary building blocks in place, the digital journey began with enabling our systems to communicate with each other. So, we started building services that would allow us to make predictions, conduct market analysis, and ultimately result in a better data foundation. This knowledge gave us an advantage over competitors, providing us with a competitive edge.

At the beginning of the digitalization journey, NorBulk bought external data, such as AIS data, and attempted to combine it with internal data and built solutions on top of that in-house. This helped them establish a stronger data foundation and allowed them to analyze global trends where they previously lacked internal data.

As the industry evolved, platform companies emerged. These companies specialized in combining external open data with the internal data of multiple companies. This allowed the platforms to expand their data foundation, include more data points, and ultimately provide even better solutions. Thus NorBulk learned that there was little competitive advantage in doing it in-house and started collaborating with the platform providers instead. A data scientist explained this:

> We used to purchase raw data, like AIS data, and build things on top of it. However, there isn't a competitive edge in doing this ourselves as the companies that only focus on this, could do it much better.

> Therefore, it made sense to join the platforms instead. We were part of a startup journey, where the startup used our data combined with AIS data to train their algorithms. This enabled us to focus on integrating the different services and data sources to create value for our chartering managers.

NorBulk has now embraced the emergence of platforms; several platforms are now integrated into their day-to-day operations. For example, they use platforms to discover new business opportunities, one of these is a mail parsing platform, which analyzes the flow of emails to identify industry trends. They also utilize a platform to analyze AIS data, uncovering supply and demand for various commodities. Lastly, they use platforms to find estimated waiting time and sea time for the different ports around the world, based on market data and data from other bulk operators. All these different platforms utilize Artificial intelligence (AI) and machine learning, enabling NorBulk to make longer-term predictions and trades.

Adopting different platforms has enabled NorBulk to access better data and predictions. However, this also means that their competitors can do the same, creating a more level playing field in the industry. As one charter manager noted:

> In IMOS, it is standardized to use a 10 % sea margin to avoid losing money because of the varying weather conditions. Where I was before, we used 10% in the summer; when winter came, we used 15-20%. We didn't have anything more than when it was winter, we adjusted. When I came here (NorBulk), I started to use weather platforms and changed the sea margin according to the prediction of the platform. By doing this, we could reduce the risk and earn more money by not taking bad trades. At the same time window, I saw that the other companies did not focus on the sea margin, at least not over to the Gulf. However, in a couple of years, I could see that more people have access to the same data and platforms, and their use has become more standardized. We

> see that the whole market is asking for more money over the Gulf now than it did before because the market has adjusted for the sea margin.

By using these platforms, NorBulk can optimize its voyage performance and profitability by adjusting its sea margin according to the predicted weather conditions and port delays. However, as more companies adopt these platforms, the competitive advantage of having access to such data declines.

NorBulk thinks data sharing has come to stay, and they expect it to only grow in the future, even though the platforms are sharing the knowledge, equalling the data knowledge between competitors. NorBulk, for instance, is open to participating in platforms designed for sharing data among competitors, as long as there is an opportunity to monetize the service. They argue that the key to success in a data-symmetric landscape lies in how the data is used to make good decisions.

The algorithms used by platforms are continually improving over time, and they are becoming better than humans at some tasks. There may soon be no good reasons for a charter manager's decisions to deviate from the algorithm's recommendations. Especially when the algorithm has access to extensive historical data to make informed decisions, where the charter manager has limited information to work with. A chief officer stated:

> Is there any reason for a charter manager to have a better opinion than an algorithm about the weather at a specific location in August? No, there isn't. This happens today, and suddenly it starts raining. This won't be acceptable in the future. We need to address this to improve this aspect of the business. How much time do we have? 5 years, 10 years, 2 years? It won't happen overnight for competitors either.

The transition towards more machine-informed decision-making is something NorBulk is striving to achieve, but as our informant notes, it is not yet a widespread practice in the industry.

As we see, the shipping industry is currently undergoing some major changes, and NorBulk is affected by these changes. Reshaping the organization to become

more data-driven is a challenging process, and needs to be done step by step. Standardized data is a requirement for digitization, but this is currently one of NorBulk's biggest obstacles to become data-driven.

5.2 Lack of standardization

Digitalization has many barriers to overcome in the shipping industry, and one of the biggest is the lack of standardization. The complexity and longevity of the industry has created a lot of heterogeneous and independent information systems. This heterogeneity is also seen on the organizational level as teams within the same company use different systems. NorBulk is currently experiencing these difficulties, and have yet to overcome them.

NorBulk runs a flat and decentralized structure, and they are organized into eight commercial teams. Each team has responsibility for a geographical area or a ship segment, and they are provided with a lot of autonomy from management. This works well regarding the speed of decision-making and knowledge pooling, but the autonomy creates unique workflows within each team. Some teams in NorBulk use some parts of the available software systems and platforms, and some use others. How the teams use the given software also differs, and this makes it difficult to implement company-wide digitalization. A C-level executive explained how this affects digitalization in NorBulk:

> One of the main issues we face is that we are organized commercially, and as a result, it becomes very challenging to standardize processes across all teams. However, we have addressed this in Operations, and we see that it is easier to implement changes there.

The complexity of bulk shipping makes standardizing the chartering process even harder. Bulk shipping does not have the standards liner and container shipping has. NorBulk´s business model is to match dry bulk cargo with vessels, and then charge a premium for taking on this risk. This is profitable because the factors that determine the price of this operation (freight) are highly varying. The price

of fuel (bunker), chartering of a ship, crew cost, potential weather hazards, and geographic location play into the risk equation. This makes long-term planning extremely difficult. A charter manager explained these difficulties as follows:

> Even though I know that I need a boat 3-4 months in advance, I cannot book a boat until 10-14 days beforehand due to the uncertainty in the industry. Everything depends on the price of the ship, which varies from week to week.

Another charter manager highlighted that this complexity in the market makes it hard to measure the quality of the deals:

> Since I am the only one in NorBulk that does my ship segment in my geographical area (Black Sea), there is no one in-house who is qualified to provide feedback on whether I am making the right decisions or not.

NorBulk is currently addressing the problem regarding standardization, but changing the workflow of chartering managers is hard. The charter manager position has historically had a lot of autonomy, although NorBulk sees that some of these processes need standardization so that they can reap the benefits of digitalization. The introduction of a weather and port platform is a great example of this problem internally in NorBulk. The platform gives charter managers insights into port-related data, such as estimated time in port, port cost, terminal restrictions, and historical weather data. Given that a vessel spends 40 % of its time in ports, this could potentially provide NorBulk with great value. Nevertheless, this platform subscription was recently terminated. Although there were many reasons behind the subscription termination, the lack of standardized use of the platform was a large factor. Some chartering managers used the service extensively, some used it as a "back-up" check, and some did not use it at all. One of the C-level executives we talked to described it as follows:

> Implementing a tool like the weather and port platform is a step in the right direction, but I don't believe our organization is ready for it. We need more standardization in the chartering process before we can

adopt new solutions.

Nevertheless, some parts of the chartering department are seeing the rewards of increased standardization of the chartering process. One charter manager highlighted this for us:

> I experience a significant increase in efficiency when using software that all other team members use.

As shown in this section, standardization is crucial for digitalization and the implementation of digital tools in the chartering process. The complexity of bulk shipping is making it hard to standardize, but employees in NorBulk see how standardization of certain processes enables more data-driven chartering. How this data is used and contextualized internally is essential to further increase the value of digitalization.

5.3 Use of data

With data-driven operations, the emergence of platforms has made acquiring high-quality data increasingly accessible. However, with an abundance of readily available data, numerous overlapping platforms, and constant time pressure, it has become increasingly challenging to utilize the data effectively. A successful company must be able to use data effectively to gain a competitive edge. As one data scientist noted:

> In a time when people have access to the same data, how that data is used creates a competitive edge.

Effective use of data depends on up-to-date and correct data to work, which is not always the case. The availability of ships is, for example, a crucial factor in the shipping industry. However, with the abundance of information available, it can be challenging to distinguish which ships are genuinely available. For instance, a ship's GPS may indicate that it is present in a particular area, but in reality, it may not be available for charter. As one charter manager explains:

> It's easy to get buried in a lot of wrong information. When checking for available ships on our platform, there are a lot of ships that are not available. For example, based on their GPS, fifty ships are available in the Black Sea. However, in reality, nine out of ten ships, are not available.

The shipping industry is no stranger to information overload either. With the increasing number of platforms available, it can be challenging to keep track of all the data being produced, leading to sub-optimal utilization of data. Additionally, some brokers may not keep up with the latest information on the market and send out outdated lists of available ships. This results in off-market ships appearing as available on platforms. A charter manager explains,

> Some brokers just spam a list of positions and boats they see in the market. Often, some of these boats may already be booked, but there are some brokers who don't catch up on this information, as they are not deeply involved in the market, and they just send out the list. This results in off-market ships appearing as available on our platform when they are not. Sometimes it may seem like, "Oh, ten new boats are becoming available," but in reality, all of them are already taken.

Charter managers need to be aware of this since it can negatively impact the effectiveness of certain platforms. As one charter manager pointed out, if a platform or system fails to provide accurate information even once, it often colors their experience, making it challenging to continue relying on and trusting the platform. For many charter managers, speed and reliability are top priorities when it comes to accessing information. As one charter manager described:

> It is important for me that it is fast and reliable. I don't need so much information. With some platforms, it's too much.

In shipping where time is highly important, having access to timely and accurate information can make all the difference in securing deals and ensuring smooth operations. However, it is also essential to balance providing enough information

to make informed decisions and overwhelming users with too much data. NorBulk uses several platforms, which often do not communicate with each other. Therefore, working with the different platforms and integrating them effectively is crucial. NorBulk found out that they could focus more on creating value for the shipping managers by joining the platforms and have emphasized using internal business logic to display the right data at the right time is the way to go. One of the C-level officers noted:

> We use our business logic to display the right data at the right time. We are, for example only interested in showing certain data to a charter manager when certain conditions are true, otherwise, we hide it.

One thing that hindered NorBulk from using the data effectively was the excessive complexity of the purchased services and platforms. The complexity would lead to people wanting to avoid using the service, or people would use the service incorrectly, leading to ineffective use of the platforms. Therefore, NorBulk has hired two data scientists and two cloud architects in the last years. By expanding its IT department, NorBulk can make numerous minor adjustments and effectively tailor the IT platforms to suit its specific business logic. Growing IT capabilities have enabled them to integrate the different platforms and services into one platform, thus reducing the complexity and amount of platforms charter managers had to deal with. This has also reduced the number of clicks necessary for charter managers to access information, as one manager explained:

> We have a vision that everything should be just a click away for a charter manager when they need to make a decision.

The ability to access information quickly is seen as critical, as it can help to ensure that decisions are made in a timely and informed manner. As a senior manager noted:

> The earlier you receive the information, the higher the likelihood that the decision made will be good.

With more digital competence, NorBulk has been able to customize the platforms

to show the desired data when in need, making it easier for charter managers. This approach is part of a broader strategy towards a more event-driven operation, where data is displayed when the corresponding event occurs. The event-driven operations helps charter managers avoid information overload. It enables them to filter out less critical information and focus on the right data at the right time. A senior manager explained:

> We have event-driven operations, which means that we use business logic combined with IT development to notify the user if an event occurs. For instance, if a ship comes to a halt when it's supposed to be moving.

This approach enables them to have real-time visibility and control over their operations, while freeing up time for charter managers and helping them have the information they need, when they need it. To be able to do this, they needed to incorporate their business knowledge into the data analysis. For instance, the e-mail parsing platform is a source of data that NorBulk uses to forecast trade movements. A data scientist explained:

> We incorporate our business knowledge into the data analysis in many ways, for example with the e-mail parsing platform. The e-mail parsing platform is a source of data that allows us to see how much cargo is being circulated from week to week. We know that in the Handymax segment, the number of e-mails circulated on Monday before 12 PM drives how the rest of the week will look. We can use this logic and create our own time series forecasting that is more relevant to our specific areas or trades.

By leveraging the logic behind the number of e-mails circulated on Monday before 12 PM in the Handymax segment, they forecast what is relevant for them. By combining internal logic and data analysis such as time series forecasting, NorBulk captures value in its operations.

Summarized, NorBulk aims to integrate and streamline platforms to provide

relevant data to charter managers using internal business logic. By presenting critical data at the right time, NorBulk is able to support chartering managers when making decisions. At the same time, we see that chartering managers still rely on business relationships and the personal network to find new deals, confirm critical details in the late stage, and deliver high quality services.

5.4 The Role of Business Relationships

In the past, having strong business relationships was often a key factor in securing and accessing deals in the shipping industry. As one charter manager described:

> Before, there was a lot of business over the dinner table during corporate dinners. If you had a good reputation and knew certain customers, you would also get to do business with them.

This reflects how the shipping industry used to rely heavily on personal connections and loyalty between customers and suppliers. Having a good reputation and a long history of cooperation could give an advantage over competitors and ensure access to profitable deals. However, this situation has changed in recent years due to the increasing use of technology and data in the industry.

Today, the industry has become more dynamic, with technology playing a larger role in how deals are obtained. As one younger charter manager said:

> The way I acquire cargo is very dynamic, for example, through the phone ringing or getting a mail or notification on a platform.

Technology has enabled more efficient and transparent ways of finding and acquiring cargo. Instead of relying only on personal contacts and referrals, charter managers can also use platforms and tools that provide real-time information and opportunities for trade (see Figure 4.2). This means charter managers must be more responsive and flexible to seize the best deals available in the market. This shift towards more dynamic and technologically-driven methods of acquiring business, has reduced the need for long-standing business relationships and made

the ability to respond quickly to opportunities more critical than before. These changes indicate a shift from relying heavily on relationships to the need for incorporating digital technology as well. Despite these changes, relationships are still important, as one charter manager explained:

> Relationships are not dead; that's why we still travel and attend dinners to have face-to-face interactions because so much is based on trust.

This emphasizes that relationships are still important in the shipping industry, especially in building trust and confidence between parties. Face-to-face interactions help in establishing trust and mutual understanding, which is beneficial in complex or uncertain situations. For example, a phone call to a trusted port agent can make all the difference in a critical and urgent situation. Strong relationships between industry players have always been essential, but with the digital advancements and technology shifts in the industry, the role of these relationships is evolving. As one charter manager noted:

> Having good relationships today is alfa and omega, but in the future, this may well change.

Relationships are still important today, but they may not be enough alone to ensure success in the future. As the shipping industry becomes increasingly complex, with smart ports, smart ships, and a lot of data, relationships, and networks will continue to play a crucial role in navigating this growing complex landscape. However, charter managers will need to adapt to the increased use of digital solutions, and new needs and expectations of customers. While machines may automate many tasks, negotiation, and networking will continue to be critical. As one senior manager exclaimed:

> Technology may take away all those silly decisions we make, but the network and relationships are what will endure. Negotiations cannot be taken over by the system yet.

This quote suggests that while technology can enhance efficiency and accuracy in decision-making, it cannot completely replace the human factor in all aspects.

Negotiation is still a human skill that requires communication, persuasion, and compromise. The human network is what enables charter managers to find solutions that satisfy both parties and create value for both sides. While good relationships contribute to the creation of new business opportunities and facilitate smooth processes.

Our findings highlight the pains and gains of digitalization and how this is shaping the company and the entire shipping industry. We see that value creation in NorBulk is complicated and relies on many different activities, resources, and partners. Digital technology creates value through the adoption of platforms, but digital technology, in general, has limitations in representing the complex and dynamic reality of the industry. Therefore, knowledge workers play a vital role in customizing services to meet customer demands and create value through their relationships, networks, and negotiation skills. The findings suggest that knowledge workers are affected by digitalization in various ways. On one hand, they benefit from the increased efficiency, productivity, and insights that digital technology provides. On the other hand, they face challenges with adapting to new tools and processes, dealing with information overload and uncertainty, and maintaining their competitive edge in a data-driven environment. Next, analyzing the findings expose two groups of company resources that enable value creation: standardizable resources and non-standardizable resources.

Chapter 6

Analysis

Analyzing how digital innovation and the integration of digital technology can create value for knowledge work in NorBulk, we identified two groups of company resources[1] that enable value creation: standardizable resources and non-standardizable resources. In the first section, we investigate the role of digital technology in value creation in NorBulk by using theorizing on digital innovation (Alaimo & Kallinikos, 2022; Gregory et al., 2021; Henfridsson et al., 2018; Yoo et al., 2012). Then, we expose how non-standardizable resources such as domain knowledge, relationships, and negotiation skills are essential to create services that meet customer demands by using theorizing on customization and standardization in service-oriented business models (Aas et al., 2020; Cenamor et al., 2017; Garcia Martin et al., 2019; Hansen et al., 1999; Hydle et al., 2021).

6.1 Value creation through standardization

The digitization of data and the unique data characteristics have transformed NorBulk's operations, shifting them from reliance on fax to using external platforms and participating in value creation across the globe. One key characteristic of digital data is the homogenization capacity - the ability to standardize data from various sources into a consistent format. For this process to occur, data must be capable of being standardized, which is not always the case.

[1]We argue that all activities are resources, but not all resources are activities. Therefore, for the sake of simplicity, we refer to the combination of activities and resources as resources.

Standardized data is the building block of digital innovation and the enabler of the digital technology we have today, for example, digital platforms.

Yoo et al. (2010) argues that digital platforms have the potential to redefine industry boundaries and shape competitive dynamics, which NorBulk has experienced. Before using digital weather platforms NorBulk relied on fixed sea margin percentages based on seasonal changes, leading to potential losses due to insufficient risk assessment. When NorBulk started using weather platforms, it enabled them to make better-informed decisions on adjusting the sea margin, which reduced risk and increased profitability. Yoo et al. (2010) argues that digital platforms have the potential to redefine industry boundaries and shape competitive dynamics. This aligns with the findings in our case, where adopting weather platforms has shaped the competitive dynamics in the industry and created value for NorBulk. The early adoption of these platforms provided a competitive advantage to NorBulk.

As the findings reveal, other companies in the industry adopted weather platforms over time. This increased adoption led to the market adjusting the sea margin, and NorBulk lost its competitive advantage. This observation reflects the diffusion of information asymmetry when companies and people can access the same information, becoming data symmetric, which we discuss further in the discussion.

The importance of digital platforms for organizational sciences increases as digital technologies become more widespread (Yoo et al., 2012). NorBulk has adopted a platform to host all of its digital services, tools, digital platforms, and capabilities. This makes it possible to control multiple platforms or subsystems using the same digital tool. This results from the increasing adoption and use of digital tools within firms, as described by Yoo et al. (2012). The adoption of platforms enabled NorBulk to take advantage of all the digital shared resources by combining the different platforms and data sources in new and creative ways. Henfridsson et al. (2018) call the process of generating an individual value path by using existing digital resources in novel ways, the recombination of use; NorBulk recombined its

different tools and platforms, creating new ways of showing data at the appropriate time and leveraging an event-driven operation in their internal platform.

In addition to the recombination of digital resources, information technology facilitates the transition from industrialism to knowledge-based societies through automating and informating (Zuboff, 1985). Especially automating is highly relevant for NorBulk as their knowledge workers (charter managers) spend a lot of time on repetitive and time-consuming tasks. NorBulks platforms are currently helping charter managers by automating market data collection, e-mail handling, searching for available vessels, and collection of port conditions. The use of platforms removes some of the tensions between standardization and customization of the service NorBulk provides (Cenamor et al., 2017). In the next chapter, we will dive deeper into this balance and explore it in greater detail.

6.2 Standardization vs. customization of the service

Manufacturers are currently using digitalization to adjust from product-oriented business models to more service-oriented business models (Aas et al., 2020; Foss & Saebi, 2017). NorBulk is already a service company, but the challenges of digitalization are similar to those of manufacturers. NorBulk's business model of connecting cargo to available vessels while taking the risk for the journey has been the same for many decades. This business model has previously required a high level of customization for each customer and a high level of customer interaction. The chartering process has been based on the workflows of the chartering manager, and this role has had a lot of freedom and individuality. Digital technologies depend on a minimum level of standardization, and digitization of processes is impossible without standardization (Gregory et al., 2021). Our findings highlight this by showing that the lack of standardization in the chartering process is slowing digitalization in the organization. An example from our findings on the positive effects of standardization is how employees experience significantly increased value of the software tools when they are used consistently across the team.

Standardization is essential to achieve economies of scale, but a company cannot create a competitive advantage without customer customization and differentiation (Porter, 1996). The tailoring of each deal in NorBulk makes it hard to utilize data most optimally, thus making it hard to scale the business, both in terms of geographical locations and fleet size. The findings exposed that relationships are not dead in the shipping industry. Each deal is worth a lot of money, and the financial losses are huge if something goes wrong. That is why a high degree of customization is needed in the chartering process, both in finding suitable vessels and searching for profitable cargo. This is in line with Garcia Martin et al. (2019) literature review that highlighted the importance of customization in the value creation process. The customization is currently done by chartering managers as they utilize their network and relationships to acquire correct information and find new business opportunities. The findings exposed that relationships are used as resources that the chartering managers rely on in pressured situations. A well-timed phone call to a port agent could potentially maintain the profitability of a deal. This could enable a ship to jump the loading queue and cut waiting time by multiple days. Therefore, strong relationships and negotiation skills are extremely important resources for NorBulk.

The charter managers' skills are important considering the challenges associated with the credibility of data acquired from platforms. Some platforms have presented inaccurate or outdated information for NorBulk. However, the charter managers were not too concerned about this issue because they had learned from their own experience that models should not be viewed as absolute truth. Models are just representations of reality, not reality itself (Oreskes et al., 1994; Zuboff, 1985). Instead, charter managers view the models as a means of augmenting and informating their workflow (Zuboff, 1985). The charter managers are aware of these potential errors and can identify them due to their domain knowledge. This highlights the importance of internal domain knowledge to compensate for data -errors and limitations. Monteiro's (2022) research supports that digital technology can standardize processes, but it cannot fully automate them, and domain expertise and relationships are crucial. This results from the limits

of standardization within the company or the industry, as non-standardized processes are hard to fully automate. In our case, negotiation and relationship skills cannot be standardized to create value. Digital technology enables service standardization as certain technologies replace human activities and therefore increase productivity.

Combining digital resources and domain knowledge in platforms has made it possible to create value in new and different ways, for example, by reducing complexity and time usage for each user. One example of how NorBulk has combined internal domain knowledge and external data sources is the mail parsing platform. Since the mail platform is trained on all its customers' data, NorBulk has observed that the predictions are more general than they would like and do not always align with NorBulk's business logic. To obtain the best predictions, they combined their business knowledge with the platform's dataset to create their own AI models as a top layer. This example exemplifies a standardized process that was lacking, provoking NorBulk to use non-standardized resources to create a better solution.

All services range from customized to standardized, and this depends on the extent to which a service can be codified and delivered (Hansen et al., 1999; Hydle et al., 2021). Based on our research findings, we have observed that while achieving complete standardization of a service may be challenging, partial standardization is still attainable. This can be done through a decoupling of the service, into a combination of standardized and non-standardized resources and activities. Standardization and non-standardized resources are not a dichotomy but rather exist along a continuum between the two extremes (see Figure 6.1). In our findings, we have identified various company resources that exhibit different levels of standardization. For instance, negotiations were observed to be positioned towards the lower end of the standardization continuum, indicating a higher level of human involvement. On the other hand, the mail parsing platform was found to combine both standardizable and non-standardizable resources, occupying a position in the middle of the continuum. AIS data, on the other hand, was identified as leaning

towards the standardizable side of the continuum, requiring less human contact and exhibiting a higher potential for standardization of the service. The standardization continuum provides a framework for understanding the composition of a service by examining the level of standardization of its decoupled resources. It allows analyzing how different resources within a service can vary in terms of their standardizability. By placing resources on this continuum, we gain insights into the extent to which standardization is feasible and the implications for service delivery and customization. This perspective enables us to explore the balance between standardization and customization in service design and delivery.

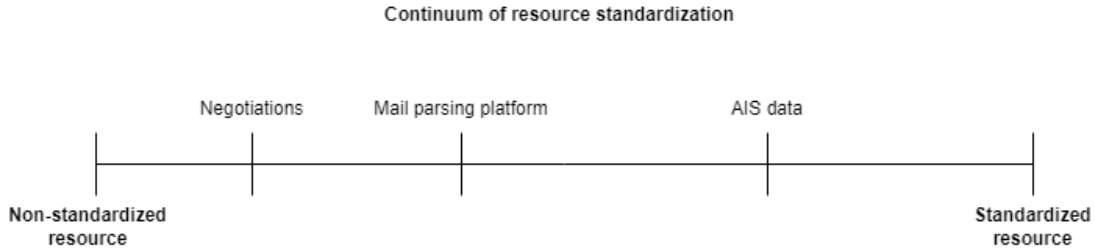

Figure 6.1: Continuum of resource standardization

Since all services can be decoupled into a combination of standardized and non-standardized resources, we argue that the standardizability of these resources together determines the degree a service is customized or standardized (see Figure 6.2). This model highlights how NorBulk has moved from a highly customized service towards a more standardized service, by using standardized resources, such as platforms. We have observed that limitations in standardized resources hinder the standardization of processes. This limitation, in turn, influences the level of customization required to fulfill customer demands. Charter managers are still heavily reliant on good business relationships if a complicated and unexpected incident occurs, and we see that the standardization level in the industry is making it close to impossible to standardize these parts of the service provision.

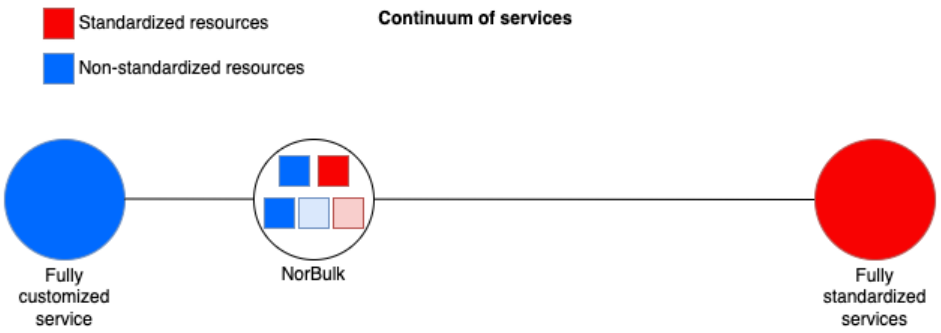

Figure 6.2: Continuum of services

Meeting customer demands with close near-mass-production efficiency is the goal, but this creates tensions internally (Hydle et al., 2021). Achieving balance between customization and standardization is proving to be difficult for many companies, and NorBulk is experiencing the same difficulties. Management in NorBulk wants more standardization because this makes it easier to scale and evaluate business performance. On the other side, chartering managers argue that the "old way" of working still creates value as the industry is far from digitalized. Our findings suggest that certain parts of the business model are hard or impossible to digitize. Relationships, trust, and negotiation skills are examples of company resources that fall into this category. These non-standardizable resources create a lot of value for NorBulk and we argue that maintaining these resources will remain important for the foreseeable future, and this is something we will discuss further in the next chapter.

Chapter 7

Discussion

The objective of this master thesis was to answer the following research questions: (1) *How is value creation in knowledge-intensive service firms changed by digital technology?* and (2) *How does this change affect the role of knowledge workers in the value creation process?* By using a digital innovation lens, we have seen that digital technology can increase companies' profitability and value creation (Henfridsson et al., 2018). Exploiting these possibilities has proved difficult for many companies, yet they still keep persuading this necessary change because of the potential rewards. Our findings highlight how platformization, data recombination, and internal digital resources create value for NorBulk. Our findings confirm the digital innovation literature on how digital technology creates value for a company (Alaimo & Kallinikos, 2022; Gregory et al., 2021; Henfridsson et al., 2018; Yoo et al., 2012). However, we also found that strong human relationships and negotiation skills are important for value creation, which has hitherto not been explicitly mentioned in digital innovation research. Therefore, we extend this literature by introducing the continuum of resource standardization (Figure 6.1). It is crucial to have a clear understanding of where different company resources fit on the standardization continuum, and thus use this understanding to implement digital technology where beneficial, and where to focus on human skills.

7.1 Value creation in knowledge-intensive service firms

To answer the first research question, we confirm the digital innovation literature on how the use of digital technologies can enable value creation (Alaimo & Kallinikos, 2022; Gregory et al., 2021; Henfridsson et al., 2018; Yoo et al., 2012). In a knowledge-intensive service firm, such as NorBulk, we have observed that the introduction of digital technology has changed value creation through standardization, recombination, platformization, and knowledge sharing among various stakeholders. Digitization has enabled data sharing, recombination, and platforms, where the introduction of platforms has provided a vast amount of digital data to the industry. This vast amount of data has proven valuable by enabling both automating and informating (Zuboff, 1985). The automating of certain tasks has increased efficiency and productivity, while the informating of other tasks has provided valuable insights for decision-making. This combination of automating and informating has contributed to the organization's ability to gain a competitive edge by utilizing high-quality data (Zuboff, 1985).

Our research has revealed that relationships and negotiation skills are essential for value creation, and this aspect has not been explicitly mentioned in digital innovation literature. Therefore, we emphasize the need to understand where different company resources fit on the standardization continuum (see Figure 6.1) to achieve the appropriate balance between standardization and customization of services. While previous research has focused on creating value through standardization (Alaimo & Kallinikos, 2022; Gregory et al., 2021; Henfridsson et al., 2018; Yoo et al., 2012), our research highlights the importance of knowing what cannot be standardized. As indicated in our analysis, standardized resources tend to receive significant attention and attract a lot of interest. However, a duality is essential when implementing digital technology. Firstly understanding the significance of non-standardized resources which provide value. Secondly, identifying which resources are standardizable and automating these resources, to free up time for personalization and customer interaction (Hydle et al., 2021).

We use the terms standardization and customization (Hansen et al., 1999; Hydle et al., 2021) to understand why the limitations of data create a necessary duality of focus when implementing digital technologies in knowledge-intensive service firms. All services range on a continuum between fully customized and standardized, and the implementation of digital technology makes services more standardized. However, as long as data has limitations in terms of representation, companies will have to be ambidextrous when facing digitalization. Only with a clear understanding of what can and cannot be digitally represented is it possible to fully reap the benefits of digitalization. Digital technology enables a higher degree of service standardization as certain technologies replace human activities and therefore increase productivity (Hydle et al., 2021). Our analysis reveals that a high degree of customization is required to meet customer demands, such as resources like relationships and negotiations. Having strong relationships with partners and customers is essential to find and acquire new profitable business, and to maintain a high level of customer satisfaction. We have seen that strong relationships work as a foundation for the entire business, which is necessary when in need. Negotiation skills keep the company profitable, especially in commercially weak periods. The foundation for the negotiations could be based on standardized data, but the entire process is hard to standardize.

Decoupling the service, and placing the different resources on the continuum of resource standardization, (Figure 6.1) creates an understanding of what to digitize and where to focus on non-digitally represented activities like relationships and negotiations as a part of customization to meet customer demands. Our analysis reveals that limitations of standardization in the industry influence how much customization is needed to meet customer demands. Since meeting customer demands with close near-mass-production efficiency is the goal, we argue that achieving the right balance between standardization and customization requires a decoupling of the service and a clear understanding of what resources can and cannot be standardized.

Our analysis also highlights the impact of industry-wide adoption of digital

technology, such as platforms. Digitalization levels the playing field by reducing information asymmetry in the industry. Consequently, this decreases profit margins and makes it challenging to derive value from data, as this is becoming common property. This reinforces our argument that focusing on non-standardized activities is crucial and that these activities are some of the most profitable and important company activities when it comes to creating competitive advantage.

7.2 The role of knowledge workers in the value creation process

To answer the second research question, we confirm digital innovation literature on how digital technology, particularly platforms, can streamline operations and automate tasks for knowledge workers (Alaimo & Kallinikos, 2022; Henfridsson et al., 2018; Yoo et al., 2012; Zuboff, 1985). Tasks that previously required contacting individuals can now be accomplished by accessing information directly on platforms. The role of knowledge workers is evolving and undergoing changes as digital technology reshapes and automates various tasks. However, we have not observed a trend toward a complete replacement of knowledge workers by digital technology.

Monteiro (2022) shows how users and digital technologies are closely connected. His empirical research highlighted the vital role of "data managers" who have expertise in previous projects, internal domain knowledge, and strong relationships with close partners. These factors are crucial for addressing the limitations of data and ensuring its effectiveness. Furthermore, the research emphasized that relying solely on automation may not adequately compensate for the expertise and relational skills provided by data managers in dealing with data limitations. Adopting platforms and digital technology offers added value for the company in the form of a data-driven approach, but just up to a certain point. Digital data is heavily influenced by the methods, procedures, and technologies applied to transform the data from analog to digital, making the data nonneutral and therefore not complete on its own (Alaimo et al., 2020; Monteiro, 2022). Other

key concerns of a purely data-driven approach revolve around the legitimacy, accountability, and credibility of the data (Kitchin, 2014). Monteiro (2022) claims that it is unlikely that the data manager role will be automated, due to the nature of their skillset, which is challenging to standardize.

We confirm Monteiro's (2022) views on the importance of internal domain knowledge, understanding the context of data, and where it differs from reality. In our study, we have similarly discovered that fully automating the role of charter managers is unlikely, but instead, digital technology can augment and informate the charter manager's tasks. Charter managers benefit from their strong relationships with port agents, operators, and ship brokers, which expand their internal knowledge and aid them in navigating the context and collaborating with various stakeholders. This aspect is crucial for ensuring smooth operations.

Building on Monteiro's (2022) theorizing on internal domain knowledge, we further extend this understanding by highlighting our empirical data regarding the non-standardized tasks performed by charter managers, which are instrumental in value creation. Unlike data managers, charter managers also need to negotiate with other actors to create value, and use their network to access deals and solve problems. These skills are important and pose challenges when it comes to digitization. The negotiations, which leverage data, shed light on the ways in which digital technology can complement and enhance domain knowledge, and thus extend Monteiro's (2022) theorizing on internal domain knowledge and Monteiro's call for empirical analysis on how, where and when domain knowledge meshes with data-driven approaches (Monteiro, 2022, p. 85)

We also argue that it is crucial to explore and document the role of charter managers, by decoupling their activities and analyze by positioning them on the continuum of resource standardization (Figure 6.1). This understanding helps identify which activities and resources can be standardized and automated using digital technology, and where non-standardized human skills need to be emphasized in order to create value in situations where standardization is not effective. As knowledge workers play a critical role in value creation, this understanding allows

for the optimal utilization of digital tools while leveraging their expertise and unique contributions.

This case study confirms digital innovation literature's focus on platforms, data recombination, and internal digital resources for value creation (Alaimo et al., 2020; Gregory et al., 2021; Henfridsson et al., 2018; Yoo et al., 2012). We further confirm Monteiro's (2022) view on data managers and how internal domain knowledge is essential for contextualizing data and providing an understanding of the limitations of data. We extend Monteiro's (2022) view on data managers with a rich description of how charter managers create value through a variety of standardized and non-standardized activities. We contribute to the digital innovation literature and the role of knowledge workers by emphasizing the need to understand the placement of different activities along the standardization continuum. Digital technology should be implemented where standardization is beneficial, freeing up time for knowledge workers to do what they do best.

Chapter 8

Conclusion

This thesis explored how digital technology affects value creation in a knowledge-intensive service firm, operating in the shipping industry. We conducted a case study of NorBulk, a global dry bulk operator and charterer. We examined how they use digital platforms and digital technology to improve their decision-making and operations. Our findings highlighted that NorBulk relies on a complex combination of resources and activities to create value for its customers, some of which are standardizable and some of which are not. We discovered how value creation in NorBulk is changing due to adoption of digital platforms and tools that provide data-driven insights and predictions (Alaimo & Kallinikos, 2022; Henfridsson et al., 2018; Yoo et al., 2012). Additionally, the thesis highlights how digital technology augments the role of charter managers, enabling new forms of value creation. We further highlight the importance of knowledge workers because of their domain knowledge, relationships, and negotiation skills. These resources are crucial for value creation due to the limitations of digital technology.

Our findings highlighted that NorBulk relies on a complex combination of resources and activities to create value for its customers, some of which are standardizable and some of which are not. We provide a conceptual framework for better understanding value creation by placing resources on a standardization continuum, ranging from standardized to non-standardized resources (Figure 6.1). This understanding helps identify which activities and resources can be standardized and automated using digital technology, and where non-standardized human skills

are needed in order to create value. Digital technology should be implemented where standardization is beneficial, allowing knowledge workers to focus on their core competencies.

We contribute to existing literature on digital innovation with the conceptualization of the standardization continuum. This model can be used to optimize the interplay of digital technology and knowledge workers' unique abilities. Additionally, our research complements Monteiro (2022) theorizing on internal domain knowledge, as we offer empirical evidence that sheds light on the non-standardized tasks performed by charter managers.

8.1 Managerial implications

The shipping industry is undergoing a rapid transformation due to the increasing use of digital technologies and data. This poses both opportunities and challenges for managers who need to adapt to the changing landscape of automation and standardization in their industry. In this section, we discuss two implications for managers based on our findings.

Managers need to keep up with the changing landscape of automation and standardization in their industry. New technologies such as chatGPT-4 can enable more intelligent and adaptive automation of tasks and interactions that were previously considered non-standardizable. Managers should monitor the developments and impacts of these technologies and assess how they can leverage them to improve their performance and competitiveness.

Managers should embrace new technologies that can enhance their automation capabilities while maintaining human oversight and control. They should also pursue standardization, where standardization is beneficial, while preserving the use of human skills where that is superior. This would optimize value creation and could create a competitive advantage for the firm.

8.2 Limitations

This section discusses the limitations of our research. By recognizing these limitations, we can offer a clear and thorough evaluation of the extent and validity of our findings. Additionally, we will suggest future research recommendations to overcome these limitations and improve the understanding of the subject.

One notable limitation relates to the research design itself. As a master thesis is conducted within a limited timeframe of 17 weeks, our study faced significant time constraints. We have not examined the case company over an extended time period, and this can only be seen as a snapshot of the company. By conducting a snapshot analysis, we might have missed important dynamics and changes that occur over time. An extended research period would have allowed for a more thorough exploration with more than one iteration.

Furthermore, the use of single interviews with each participant imposed limitations on our ability to address certain topics in depth. While the interviews provided valuable insights into the participants' experiences and perspectives, a more comprehensive approach involving multiple interviews or employing other data collection methods such as observation or follow-up interviews could have enriched our understanding of the phenomenon and strengthened the validity and reliability of the findings.

8.3 Future research

We believe that our empirical findings have implications for firms that rely on knowledge work and digital technology for value creation. Since our empirical findings are limited to a single case study, we urge scholars to apply and extend the standardization continuum in various contexts beyond the case of NorBulk and the shipping industry. We also urge scholars to view digital innovation in relation to professional service theorizing when further exploring value creation in knowledge-intensive work to fully understand the interplay between digital technology and knowledge work.

Future research could examine how the continuous development of digital technology challenges what can or cannot be standardized in the shipping industry. Future research could also investigate how digital technology enables new forms of standardization in the shipping industry, such as blockchain, large language models (LLM) such as ChatGPT-4, or smart contracts.

We also encourage other scholars to examine how digital technology influences the skills and competencies required for charter managers and similar knowledge workers in knowledge-intensive work. As we have seen, digital technology enables charter managers to access and analyze large amounts of data from various sources, such as market trends, weather patterns, port congestion, and vessel performance. This requires charter managers to have not only domain knowledge and experience but also data literacy and analytical skills.

Bibliography

Aas, T. H., Breunig, K. J., Hellström, M. M., & Hydle, K. M. (2020). SERVICE-ORIENTED BUSINESS MODELS IN MANUFACTURING IN THE DIGITAL ERA: TOWARD A NEW TAXONOMY. *International Journal of Innovation Management*, *24*(08), 2040002. https://doi.org/10.1142/S1363919620400022

Alaimo, C., & Kallinikos, J. (2022). Organizations Decentered: Data Objects, Technology and Knowledge [Publisher: INFORMS]. *Organization Science*, *33*(1), 19–37. https://doi.org/10.1287/orsc.2021.1552

Alaimo, C., Kallinikos, J., & Aaltonen, A. (2020). Data and Value.

Alderton, T., & Lane, T. (2001). Bulk Carrier Vessels. An Analysis of Crew Composition and Performance, Vessel Safety and Voyage Cycles [Publisher: Unpublished]. https://doi.org/10.13140/RG.2.1.2642.0968

Alstyne, M. W. V., & Parker, G. G. (2021). Digital Transformation Changes How Companies Create Value [Section: Digital transformation]. *Harvard Business Review*. Retrieved May 9, 2023, from https://hbr.org/2021/12/digital-transformation-changes-how-companies-create-value

Alvesson, M. (2004). *Knowledge work and knowledge-intensive firms* [OCLC: ocm53393023]. Oxford University Press.

Arthur, W. B. (2009). The Nature of Technology: What it Is and How it Evolves.

Bowen, G. (2009). Document Analysis as a Qualitative Research Method. *Qualitative Research Journal*, *9*, 27–40. https://doi.org/10.3316/QRJ0902027

Cenamor, J., Rönnberg Sjödin, D., & Parida, V. (2017). Adopting a platform approach in servitization: Leveraging the value of digitalization. *International Journal of Production Economics*, *192*, 54–65. https://doi.org/10.1016/j.ijpe.2016.12.033

Chesbrough, H. (2010). Business Model Innovation: Opportunities and Barriers. *Business Models*, *43*(2), 354–363. https://doi.org/10.1016/j.lrp.2009.07.010

Chesbrough, H., Lettl, C., & Ritter, T. (2018). Value Creation and Value Capture in Open Innovation: Value Creation and Value Capture. *Journal of Product*

Innovation Management, *35*(6), 930–938. https://doi.org/10.1111/jpim.12471

Eisner, E. W. (2017). *The enlightened eye: Qualitative inquiry and the enhancement of educational practice*. Teachers College Press.

Eriksson, P., & Kovalainen, A. (2008). *Qualitative methods in business research* [OCLC: ocn181069247]. SAGE.

Foss, N. J., & Saebi, T. (2017). Fifteen Years of Research on Business Model Innovation: How Far Have We Come, and Where Should We Go? *Journal of Management*, *43*(1), 200–227. https://doi.org/10.1177/0149206316675927

Garcia Martin, P. C., Schroeder, A., & Ziaee Bigdeli, A. (2019). The value architecture of servitization: Expanding the research scope. *Journal of Business Research*, *104*, 438–449. https://doi.org/10.1016/j.jbusres.2019.04.010

Gibbert, M., Ruigrok, W., & Wicki, B. (2008). What passes as a rigorous case study? *Strategic Management Journal*, *29*(13), 1465–1474. https://doi.org/10.1002/smj.722

Gitelman, L. (Ed.). (2013). *"Raw Data" Is an Oxymoron*. The MIT Press. https://doi.org/10.7551/mitpress/9302.001.0001

Gregory, R. W., Henfridsson, O., Kaganer, E., & Kyriakou, H. (2021). The Role of Artificial Intelligence and Data Network Effects for Creating User Value. *Academy of Management Review*, *46*(3), 534–551. https://doi.org/10.5465/amr.2019.0178

Grønsund, T., & Aanestad, M. (2020). Augmenting the algorithm: Emerging human-in-the-loop work configurations. *The Journal of Strategic Information Systems*, *29*(2), 101614. https://doi.org/https://doi.org/10.1016/j.jsis.2020.101614

Hansen, M. T., Nohria, N., & Tierney, T. (1999). What's your strategy for managing knowledge? *Harvard Business Review*, *77*(2), 106–116, 187.

Henfridsson, O., Nandhakumar, J., Scarbrough, H., & Panourgias, N. (2018). Recombination in the open-ended value landscape of digital innovation. *Information and Organization*, *28*(2), 89–100. https://doi.org/10.1016/j.infoandorg.2018.03.001

Hydle, K. M., Hellström, M., Aas, T. H., & Breunig, K. J. (2021). Digital Servitization: Strategies for Handling Customization and Customer Interaction. In M. Kohtamäki, T. Baines, R. Rabetino, A. Z. Bigdeli, C. Kowalkowski, R. Oliva, & V. Parida (Eds.), *The Palgrave Handbook of Servitization* (pp. 355–372). Springer International Publishing. https://doi.org/10.1007/978-3-030-75771-7_23

International Chamber of Shipping and BIMCO. (2021). *Seafarer Workforce Report* (2021 Edition). Witherbys.

Kalouptsidi, M. (2014). Time to Build and Fluctuations in Bulk Shipping. *American Economic Review*, *104*(2), 564–608. https://doi.org/10.1257/aer.104.2.564

Kitchin, R. (2014). Big Data, New Epistemologies and Paradigm Shift. *Big Data & Society*, *1*, 1–12. https://doi.org/10.1177/2053951714528481

Kohtamäki, M., Parida, V., Rabetino, R., Sjödin, D., & Henneberg, S. (2023). Framing the digital servitization path towards autonomous solutions.

Løwendahl, B. R. (2009). *Strategic management of professional service firms* (3. ed., 2. impr). CBS Press.

Monteiro, E. (2022). *Digital oil: Machineries of knowing*. The MIT Press.

Oates, B. J., Griffiths, M., & McLean, R. (2021). *Researching information systems and computing* (Second edition). SAGE Publications Ltd.

Oreskes, N., Shrader-Frechette, K., & Belitz, K. (1994). Verification, Validation, and Confirmation of Numerical Models in the Earth Sciences [Publisher: American Association for the Advancement of Science]. *Science*, *263*(5147), 641–646. https://doi.org/10.1126/science.263.5147.641

Osterwalder, A., Pigneur, Y., & Clark, T. (2010). *Business model generation: A handbook for visionaries, game changers, and challengers* [OCLC: ocn648031756]. Wiley.

Peters, C., Blohm, I., & Leimeister, J. M. (2015). Anatomy of Successful Business Models for Complex Services: Insights from the Telemedicine Field. *Journal of Management Information Systems*, *32*(3), 75–104. https://doi.org/10.1080/07421222.2015.1095034

Plomaritou, E., & Jeropoulos, S. (2022). The digitalisation in chartering business: Special reference to the role of e-bill of lading in the bulk and liner markets. *Journal of Shipping and Trade*, *7*(1), 28. https://doi.org/10.1186/s41072-022-00129-2

Port of Rotterdam. (2023). The digital port | Port of Rotterdam. Retrieved May 14, 2023, from https://www.portofrotterdam.com/en/to-do-port/futureland/the-digital-port

Sjödin, D., Parida, V., Kohtamäki, M., & Wincent, J. (2020). An agile co-creation process for digital servitization: A micro-service innovation approach. *Journal of Business Research*, *112*, 478–491. https://doi.org/10.1016/j.jbusres.2020.01.009

Thagaard, T. (2018). *Systematikk og innlevelse en innføring i kvalitative metoder* (5. utg) [OCLC: 1090613355]. Fagbokforl.

UN. (2016). Maritime Transport Is 'Backbone of Global Trade and the Global Economy', Says Secretary-General in Message for International Day | UN Press. Retrieved May 21, 2023, from https://press.un.org/en/2016/sgsm18129.doc.htm

UNCTAD. (2022). *Navigating stormy waters*. United Nations.

Yang, Y., Zhong, M., Yao, H., Yu, F., Fu, X., & Postolache, O. (2018). Internet of things for smart ports: Technologies and challenges [Conference Name: IEEE Instrumentation & Measurement Magazine]. *IEEE Instrumentation & Measurement Magazine*, *21*(1), 34–43. https://doi.org/10.1109/MIM.2018.8278808

Yin, R. K. (2018). *Case study research and applications: Design and methods* (Sixth edition). SAGE.

Yoo, Y., Boland, R. J., Lyytinen, K., & Majchrzak, A. (2012). Organizing for Innovation in the Digitized World [Publisher: INFORMS]. *Organization Science*, *23*(5), 1398–1408. Retrieved March 27, 2023, from http://www.jstor.org/stable/23252314

Yoo, Y., Henfridsson, O., & Lyytinen, K. (2010). Research Commentary: The New Organizing Logic of Digital Innovation: An Agenda for Information Systems Research [Publisher: INFORMS]. *Information Systems Research*, *21*(4), 724–735. Retrieved April 24, 2023, from http://www.jstor.org/stable/23015640

Zuboff, S. (1985). Automatefin-fonnate: The two faces of intelligent technology. *Organizational Dynamics*, *14*(2), 5–18. https://doi.org/10.1016/0090-2616(85)90033-6

Appendices

Appendix A

Interview Protocol

Intervjuguide

I innledningen vil vi spørre om det er greit om vi tar opp lyd og tar notater fra møtet. Vi vil informere om hvordan de kan trekke samtykke, og hvordan de kan få slettet personlige data. Vi vil også introdusere tema og problemstilling, og hvordan dataene skal brukes, og hvem som får innsyn i dataene.

Innledning

1. Kan du fortelle litt om deg selv, og din nåværende stilling?
    - Hva er din nåværende stilling og ansvarsområde?
    - Hvilken erfaring og bakgrunn har du innen shippingindustrien?

Beslutningsprosess

2. Kan du ta oss igjennom hvordan du bruker PortLog?
    - Er det noen deler av prosessen du ser på som unødvendig eller tidkrevende?
    - Hva er dine mest brukte funksjoner i systemet og hvorfor?
    - Hvilke funksjoner ser du etter i et slikt system?
    - Hvilke fordeler er det å bruke et slikt system/platform.
    - Er du redd for at en slik platform kan vanne ut konkurransefordelene til NorBulk?
    - Hva tjener du mest penger på? Være nøyaktig? Personlig deals - bedre data enn konkurrenter.

3. Når du undersøker en mulig havn, hvordan gjør du det?
    a. Hvis port-operatør - Hvordan relasjon har du til port-opertøren?
        i. Er du den eneste som får informasjon fra port-operatørene dine?
        ii. Hvor ofte kommuniserer du med port-operatørene?

Digitalisering:

4. Hvordan har digitalisering påvirket shippingindustrien de siste årene?
    a. Hvordan har digitalisering påvirket din rolle som en shipping manager og oppgavene du utfører?

5. Har du opplevd endringer i (last kunder og redere) atferd og forventninger til NorBulk?

6. Har du opplevd endringer i konkurrentenes atferd?
    a. Hva er din opplevelse av endringer i NorBulk - i møte med eksterne endringer?
        i. (kultur, teknologi, ansettelser)
    b. Hva tror du har bidratt til denne endringen hos konkurrenter

7. Hvilke drivere har drevet digitaliseringen/endringene i bransjen?
    a. Hvilke utfordringer har du støtt på, hvis noen? (barrierer)

8. Når var det sist du tok i bruk et nytt verktøy?
    a. Hva var det som gjorde at du tok i bruk dette nye verktøyet?

9. Kan du dele noen eksempler på vellykkede digitaliseringsinitiativer/ teknologiske endringer innen ditt arbeidsområde?

10. Hvordan sikrer du at du holder deg oppdatert på de nyeste digitaliseringsfremskrittene i bransjen?

Annet:

11. Er det stor konkurranse fra Logtech-selskaper? (Eller andre logistikk selskaper)

12. Blir synlighet/sporbarhet stadig viktigere for kundene dine?

13. Kan du fortelle litt om hvordan det er å jobbe i autonome team, og hvordan dette bidrar inn i beslutningsprosessen

14. Til slutt - er det noe vi burde spurt deg om, som vi ikke har spurt deg om?

Appendix B

Consent Form and Information Letter

Samtykke for behandling av personopplysninger i forskningsprosjekt

Vil du delta i forskningsprosjektet

datadrevet beslutningstagning i shippingbransjen

Dette er et spørsmål til deg om å delta i et forskningsprosjekt hvor formålet er å undersøke hvordan beslutninger tas i shippingbransjen og hvordan data blir brukt som et hjelpemiddel i beslutningsfasen. I dette skrivet gir vi deg informasjon om målene for prosjektet og hva deltakelse vil innebære for deg.

Formål

Formålet med prosjektet er å undersøke hvordan beslutninger tas i et moderne datadrevet shippingselskap. Vi ønsker å se om hvordan systemer og hjelpemidler kan bidra til å ta gode beslutninger og i hvilken grad ansatte i shippingselskap bruker disse hjelpemidlene. Resultatet skal brukes i en masteroppgave, omhandlende temaet "datadrevet beslutningstagning".

Hvem er ansvarlig for forskningsprosjektet?

Universitetet i Oslo er ansvarlig for prosjektet i samarbeid med selskapet Western Bulk.

Hvorfor får du spørsmål om å delta?

Du er spurt om å delta i dette forskningsprosjektet fordi du jobber i selskapet Western Bulk, og er involvert i system PORTLOG. Det er 10 andre som også har blitt spurt om å delta i dette forskningsprosjektet. Alle intervjuene er godkjent av kontaktperson i Western Bulk.

Hva innebærer det for deg å delta?

Hvis du velger å delta i prosjektet innebærer det at du deltar på et semistrukturert intervju. Intervjuet vil inneholde spørsmål om dine arbeidsoppgaver i Western Bulk, med fokus på datadrevet beslutningstagning. Opplysningene som samles inn er begrenset til intervjuets varighet, og vil bli samlet inn gjennom lydopptak og notater.

Det er frivillig å delta

Det er frivillig å delta i prosjektet. Hvis du velger å delta, kan du når som helst trekke samtykke tilbake uten å oppgi noen grunn. Alle opplysninger om deg vil da bli anonymisert. Det vil ikke ha noen negative konsekvenser for deg hvis du ikke vil delta eller senere velger å trekke deg.

Ditt personvern – hvordan vi oppbevarer og bruker dine opplysninger

Vi vil bare bruke opplysningene om deg til formålene vi har fortalt om i dette skrivet. Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket.

Våre veiledere ved Universitetet i Oslo vil ha tilgang, samt oss student deltakere. Vi vil innføre tiltak for å sikre at ingen uvedkommende får tilgang til personopplysninger, ved å erstatte navn og kontaktopplysninger med en kode som lagres på en egen navneliste adskilt fra øvrige data. Du som enkeltperson vil ikke kunne gjennkjennes i publikasjon.

Hva skjer med opplysningene dine når vi avslutter forskningsprosjektet?

Prosjektet skal etter planen avsluttes [01/06/23]. Ved prosjektslutt blir personopplysninger slettes.

Dine rettigheter

Så lenge du kan identifiseres i datamaterialet, har du rett til:
innsyn i hvilke personopplysninger som er registrert om deg,

- å få rettet personopplysninger om deg,

- få slettet personopplysninger om deg,
- få utlevert en kopi av dine personopplysninger (dataportabilitet)
- å sende klage til personvernombudet eller Datatilsynet om behandlingen av dine personopplysninger.

Hva gir oss rett til å behandle personopplysninger om deg?

Vi behandler opplysninger om deg basert på ditt samtykke.

På oppdrag fra Universitetet i Oslo har NSD – Norsk senter for forskningsdata AS vurdert at behandlingen av personopplysninger i dette prosjektet er i samsvar med personvernregelverket.

Hvor kan du finne ut mer?

Hvis du har spørsmål til studien, eller ønsker å benytte deg av dine rettigheter, ta kontakt med:

- Universitetet i Oslo ved Jørgen Stensrud (jorgefs@ifi.uio.no), Gregor Askjer (gregoras@ifi.ui.no) eller veileder Barbro Renland Haugjord (barbrn@ifi.uio.no)
- Vårt personvernombud kan nåes på epost: personvernombud@uis.no
- NSD – Norsk senter for forskningsdata AS, på epost (personverntjenester@nsd.no) eller telefon: 55 58 21 17.

Med vennlig hilsen

Barbro Renland Haugjord	**Gregor Askjer**	**Jørgen Stensrud**
Prosjektansvarlig (veileder)	Student	Student

Samtykke for behandling av personopplysninger i forskningsprosjekt

Samtykkeerklæring

Jeg har mottatt og forstått informasjon om prosjektet datadreven beslutningstagning, og har fått anledning til å stille spørsmål. Jeg samtykker til:

- □ å delta på intervju

Jeg samtykker til at mine opplysninger behandles frem til prosjektet er avsluttet, ca. *01/06/23*

(Prosjektdeltakers navn med blokkbokstaver)

---/---/---
(Sted
/dato
/prosjektdeltakers signatur)