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Critical success factors of the Norwegian offshore support vessel industry

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Abstract

Since the middle of the 1960s, the Norwegian oil industry has been a major source of investments, earnings, and value creation for the whole country. Operating in the upstream logistics of the sector, offshore support vessels (OSVs) are essential for supporting installations throughout the Norwegian continental shelf. This assignment looks at Norwegian OSV companies which are involved in this industry. Fifteen such companies were found after thorough searches and cooperation with industry workers. Using a mixed-methods approach, the study looks into critical success factors (CSFs) in the Norwegian OSV industry. After a thorough document review, 27 CSFs were identified and placed into 11 major categories. These included strategic management, reputation, regulatory, supplier management, bidding process, workforce, innovation, competitiveness, operations, financial, and environment.

The study highlighted how important it is to uphold strict operational standards, with the highest priority going to operational quality. Qualified staff, risk reduction, cost effectiveness, and sustainability initiatives were further important variables. Even while some criteria, such as environmental licensing fees and collaboration with universities, were considered relevant, their immediate influence was restricted, therefore they were ranked lower. All things considered, these results highlight how important it is for maritime companies to put safety, effectiveness, and trustworthiness first in order to secure long-term success in the offshore support vessel industry.

Keywords

Critical success factors, offshore support vessels, oil and gas, Norway, maritime

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OSV: Offshore support vessel (Aas et al., 2009).

PSV: Platform supply vessel (Chagas et al., 2023).

AHTS: Anchor handling tug supply (Skoko et al., 2024).

SVPP: Supply vessel planning problems (Santos et al., 2023).

CSF: Critical success factors (Queiroz & Mendes, 2020).

DOC: Document of compliance (Anish, 2021).

NCS: Norwegian continental shelf (Aas et al., 2009).

IMO: International Maritime Organization (International Maritime Organization, n.d.).

NMA: Norwegian Maritime Authority (Norwegian Maritime Authority, n.d.)

ITT: Invitation to tender (LLC, n.d.).

RFP: Request for proposals (LLC, n.d.).

HSEQ: Health, safety, environment and quality (EcoOnline, n.d.).

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1 Introduction

1.1 Research background

The Norwegian oil industry has played a significant role in the country's economy. In the mid 1960s the first extractions permits were rewarded for the oil and gas riches along the Norwegian coast. Today, almost 60 years later, the industry remains Norway's most significant in terms of investments, income to the treasury, and percentage of total value creation (energidepartementet, 2021). One crucial aspect of the Norwegian oil industry is the use of offshore support vessels (OSVs), which is a part of their upstream logistics. In this industry, "upstream logistics" refers to supplying the installations with necessary supplies, while "downstream logistics" refers to transporting oil and gas from the installations to onshore customers (Aas et al., 2009).

The Norwegian supply industry in itself is also a powerful factor in Norway's economy. With over 2000 businesses, this industry is the second largest in Norway in terms of turnover, only beaten by the oil and gas trade, which again is reliable on the supply industry (Norskpetroleum, n.d.-c). These businesses provide a wide range of products and services covering each stage of the petroleum value chain. The companies are key participants in the entire discovery process, from the first data processing, seismic surveying, and drilling services to the final stages of engineering and platform solution development (Queiroz & Mendes, 2020).

There are 2 279 965 km² of sea under Norwegian jurisdiction in total. Petroleum may be present in sedimentary rock, which makes up about half of the seabed's surface (Norskpetroleum, n.d.-a). The oil and gas production takes place offshore and is supported by two main types of units; oil rigs and production units (Chagas et al., 2023). Platform supply vessels (PSVs) are specialized ships designed to support offshore drilling and production operations. These vessels play a vital role in the daily operations of oil and gas platforms, ensuring the smooth functioning of the offshore facilities. They transport essential supplies, equipment, and personnel to and from the platforms, making them an important part of the industry's logistics.

The optimal design of offshore support vessels is far more complex than that of other transport-related vessels due to the variety of trades and operating duties that are assigned to

them (Gaspar et al., 2016). With the capacity to simultaneously carry various chemicals, drybulks, offshore containers, or remotely operated submarine vehicles, and involvement in a variety of tasks like rig anchor handling or subsea support, the vessels' technical specifications are extremely diverse (Adland et al., 2017). OSVs are equipped with advanced technology and specialized features, such as dynamic positioning systems, which allow them to maintain their position relative to the platform without anchoring (Aas et al., 2009). This capability is crucial in harsh weather conditions common in the North Sea region, where Norway's oil fields are located. These vessels are also equipped with onboard cranes, cargo holds, and tanks to safely transport various types of supplies, including fuel, drilling fluids, and construction materials. Still, rapid technological advancement could make design solutions with less-than-ideal configurations uncompetitive in a matter of years (Gaspar et al., 2016).

Also anchor handling tugs (AHTs) are essential vessels that are necessary to the functioning of drilling platforms, oil rigs, and other nautical constructions (Skoko et al., 2024). These specialized boats are made to manage mooring systems and hefty anchors, guaranteeing the secure positioning and movement of offshore buildings (Skoko et al., 2024). Given their winches, robust towing gears, and sophisticated dynamic positioning systems, AHTs are well-suited to maneuver and steer massive constructions through demanding maritime conditions. They help with the installation and removal of offshore rigs and platforms in addition to setting and retrieving anchors. AHTs also help with the installation and upkeep of cables and pipelines underwater.

The demand for platform support vessels in the Norwegian oil industry has been high due to the increased drilling rig activity in the sector (Snyder, 2022). Within the next year or two, Norwegian shipyards are expected to receive orders for new offshore vessels, according to Clarksons. They also predict that new orders for PSVs will follow the building of new subsea vessels (Maritim Logg, 2023). Supply vessels are usually chartered rather than being owned by the oil companies (Aas et al., 2009). For the duration of the contract, all OSVs are paid a daily hire. Generally speaking, spot market contracts are defined as charters that last less than thirty days; longer contracts are known as term contracts (Adland et al., 2017). This means that the oil companies manage the use of the vessels, including scheduling and routing. Uncertain demand and weather conditions make this planning difficult and result in supply vessel planning problems (SVPP) (Santos et al., 2023), in literature often referred to as vehicle routing problems (Aas et al., 2007).

About 54% of the estimated recoverable resources found in petroleum deposits on the Norwegian continental shelf have been produced and sold over the past 50 years. This suggests that within the next fifty years, there's likely to be of a lot of activity on the shelf as well (Norskpetroleum, n.d.-b). Nevertheless, in recent years, the Norwegian oil industry has faced challenges, such as volatile oil prices and the global shift towards renewable energy sources. The OSV owning companies are heavily impacted by the global economy, and they fight to stay competitive. Therefore, it is critical to pinpoint the critical success factors that influence this industry's success from its own perspective rather than from the standpoint of the oil industry as a whole.

Critical success factors are essential elements that contribute to the achievement of organizational goals and objectives. These factors vary across industries and businesses, but some common factors can be identified (Rockart, 1979). No prior study has identified and discussed CSFs in the context of the Norwegian OSV industry, despite the comprehensive OSV literature. The purpose of this study is to identify the CSFs in the Norwegian OSV industry in order to close this gap. Norwegian OSV decision-makers will benefit from this study's insights, which should strengthen and support their plans, objectives, and choices.

1.2 Research questions

The objective of this research is to address the following research questions:

RQ1: Who are the Norwegian Offshore Support Vessel companies operating on the Norwegian continental shelf?

To identify the Norwegian OSV companies that operates on the NCS a list has been put together with the help of informants working at a OSV company. Additional searches have been done in the Norwegian Shipowners Associations members list and at Tradewinds.

RQ2: What are the critical success factors of the Norwegian OSV industry?

To identify the critical success factors related to the management of the OSV fleet, a literature review is conducted.

RQ3: What is the most important critical success factors in the Norwegian OSV industry?

To identify the most important critical success factors a questionnaire survey is designed, developed, and conducted with industry specialists. Subsequently, the survey results are evaluated using descriptive statistics.

1.3 Limitations

The assignment focuses exclusively on Norwegian companies that operates on the Norwegian continental shelf. By Norwegian we mean companies registered in Norway. This means that the respondents who have contributed to this survey have ongoing operations in Norway and on the Norwegian continental shelf. The assignment focuses on the offshore supply industry, including offshore supply vessels and anchor handling towing supply vessels. The thesis does not include other types of vessels with activities related to the petroleum industry. The paper is written with a focus on the shipping companies' perception of which critical success factors that is most important in order to achieve their goals. The assignment does not include the views of oil companies or other companies that is in any way connected with the OSV companies.

1.4 Thesis structure

This paper has 6 sections. The rest of the study is organized as follows. Section 2 presents a general review of CSFs and exploration of the use of supply vessels on the Norwegian continental shelf. Section 3 presents the used methodology. Section 4 shows the result. Thereafter a discussion of the results is presented in section 5, and conclusions and further research are presented in section 6.

2 Literature review

2.1 Goal and method of the review

The main goal of the following literature search is to gain an understanding of existing research and knowledge about success factors related to the management of platform supply vessels. This involves looking at previous hypotheses, methods and approaches used in previous studies. Subsequently, relevant articles were chosen from the references of found articles to identify more relevant articles to analyze. These articles were used to understand the current knowledge of critical success factors related to offshore support vessels.

Table 1 Keyword search

No	Boolean keyword search	WOS (no. of articles)	Scopus (no. of articles)
1	TITLE-ABS-KEY ("critical success factors" AND "maritime") AND PUBYEAR > 2018 AND PUBYEAR < 2024 AND (LIMIT-TO (DOCTYPE , "ar"))	55	9
2	TITLE-ABS-KEY ("supply vessels" AND "logistics") AND PUBYEAR > 2008 AND PUBYEAR < 2024 AND (LIMIT-TO (DOCTYPE , "ar"))	23	35
3	TITLE-ABS-KEY ("offshore support vessel" AND "contracts") AND PUBYEAR > 2018 AND PUBYEAR < 2025 AND (LIMIT-TO (DOCTYPE , "ar"))	0	4
4	TITLE-ABS-KEY ("critical success factors" AND "management" AND "performance") AND PUBYEAR > 2018 AND PUBYEAR < 2025AND (LIMIT-TO (SUBJAREA , "BUSI")) AND (LIMIT-TO (DOCTYPE , "ar"))	103	152

Table 1 shows the search queries and the number of results from each database used. The searches were primarily limited to publication dates between 2019-2024. The offshore market is highly volatile and has changed rapidly, because of this we primarily search for articles published after 2018 to get the most updated research. The search was also limited to articles. Search terms used were “critical success factors” AND “maritime”, “supply vessels” AND “logistics”, “offshore support vessel” AND “contracts”, and “critical success factors” AND “management” AND “performance”. Maritime is a keyword widely used in articles on

maritime topics. It gives a slightly more open search than the word shipping, which gave greater opportunities to bring up relevant topics for our paper. The term “ar” limits the results to articles, and the term “busi” was used to limit the search to articles in the business field. Articles that were not related to these terms were not included in the analysis.

The searches resulted in a total number of 381 articles. Some of the articles were listed in both of the databases, and after screening most of the articles were disregarded. At the end there was a total of 19 articles that was found relevant for review. Note that this just gives a starting point for the review which gives an initial sample to further snowball from.

2.2 Ship managers, operators, and charterers

The maritime industry is a complex and sophisticated sector that involves various stakeholders, each playing a crucial role in the transportation of goods and people across the globe (Ben Farah et al., 2022). Among these stakeholders are ship managers, operators, and charterers, who work together to ensure the smooth operation of vessels and the delivery of cargo.

A company or organization in charge of a vessel's technical management is called a ship manager, often referred to as a document of compliance (DOC) holder (Anish, 2021). They are responsible of making sure that the required certificates and paperwork are in place and that the vessel is operated in accordance with international regulations. Typically, ship managers are in charge of all aspects of the vessel's daily operations, including crew management, maintenance, and repairs. They are also in charge of making sure the ship is managed effectively and safely while adhering to the owner's or charterer's specifications.

An operator, on the other hand, is a business or institution in charge of running a vessel for profit. They are in charge of scheduling the vessel, negotiating charter parties, and locating cargo (Mi News Network, 2022). Operators bear the primary responsibility for the vessel's financial performance, including revenue generation and expense minimization. The ship management and operator may work together in some situations; however, this is not always the case. The primary difference between an operator and a ship manager is that the last one concentrates on the vessel's commercial operation, while the former concentrates on the technical operation of the ship.

In contrast, a charterer is a business or institution that leases a ship from a shipowner for a predetermined amount of time (Papaspyros, 2023). Usually, charterers are in charge of the vessel's business use and are answerable for the cargo being carried. Oil corporations who need vessels to support their offshore operations are frequently the ones who charter vessels in the oil business. The specifications, equipment, and operation of the vessel may need to meet the demands of these charterers, which can affect the newbuilding's design and construction. For instance, in order to support their drilling or production operations, an oil business could need a vessel with particular equipment or a particular layout.

2.3 OSV market dynamics

With its ability to supply wind farms, offshore oil and gas platforms, and other marine operations with logistical support, the offshore support vessel (OSV) market is a vital part of the energy industry. Global economic conditions, environmental regulations, and technological advancements are some of the factors that impact the dynamics of this market.

Aas et al. (2009) discusses the role of supply vessels in offshore logistics in detail. The study gives a thorough explanation of fleet composition and vessel capabilities. The authors address a need for more research on the components and interactions of the upstream chain. They also suggest that the next step after gaining the knowledge foundation is to conduct research on the efficiency of the logistic system.

Using panel logistic regressions and Cox proportional hazard models, Adland & Sværen (2017) assess the factors influencing the lay-up decision for Offshore Supply Vessels in the North Sea. They find that the most significant factor is the current condition of the market, and that lower oil prices, spot day rates, and fleet utilization all increase the likelihood of a layup. The decision of lay-up is also influenced by a vessels size, age, and fuel efficiency.

In order to create a market index from heterogeneous fixture data in the offshore support vessel (OSV) market, Adland et al. (2017) estimated a hedonic pricing regression. The result shows that time fixed effects account for about 70–80% of the variation in OSV day rates. In the hedonic price regression, the spot freight rates rise dramatically as OSV power and capacity increase.

A multi-objective optimization model for tactical planning of upstream oil and gas supply chains was presented in a study by Attia, Ghaithan, and Duffuaa (2019). The study highlighted the necessity of optimizing planning and decision-making processes to improve the efficiency of operations. However, there was not a thorough examination of the particular factors related to supply vessels and how they influence upstream logistics.

The global anthropogenic emission inventory, which is relevant to the environmental laws affecting the OSV market, was discussed in detail by McDuffie et al. (2020). Examining how these rules affect the dynamics of the OSV market is necessary, as environmental concerns in the oil and gas sector gain importance.

In recent years, the optimization of supply vessel planning, scheduling, and routing has gained significant attention from researchers in the field of logistics and transportation. Optimization algorithms, new frameworks and methodologies including mathematical models has been proposed to address the scheduling and routing problems (Chagas et al., 2023; Cruz et al., 2023; Kisialiou et al., 2019; Santos et al., 2022; Vieira et al., 2021).

There doesn't seem to be much research on OSV market dynamics after 2018, which suggests that there may be a knowledge gap regarding the issues and trends the sector is currently facing. By conducting empirical studies to capture the most recent developments and dynamics within the OSV market, future research should attempt to close this gap. Research on the effects of market demand, technology breakthroughs, and regulatory changes on the business plans and operations of OSV companies is also necessary.

2.4 Critical success factors

To our knowledge no studies have been conducted on the critical success factors in the OSV industry operating on the NCS. Analyzing crucial success factors for quality management in the context of other industries may provide valuable insights for the OSV industry.

Bullen & Rockart (1981) defined critical success factors as the few key areas of activity in which beneficial outcomes are absolute essential for the manager in question to reach his goals. In recent years, several studies have focused on identifying and understanding the critical success factors in various domains, including supply chain management, sustainability, and e-learning.

Hastig and Sodhi (2020) looked into the essential elements of supply chain traceability success, focusing on the function of blockchain technology. The key factors that influence the successful implementation of blockchain for supply chain traceability are as follows: supply chain practices, leadership, technology maturity, collaboration, capabilities of the companies, and governance of the traceability efforts. The study highlights how important it is to use cutting-edge technologies and cooperative methods to improve supply chain operations' traceability and transparency.

Critical success factors in e-learning were thoroughly analyzed by Alqahtani and Rajkhan (2020), with special attention to the COVID-19 pandemic. The study identified several critical factors that contribute to the success of e-learning initiatives, including technology management, management support, increased student awareness of using e-learning systems, and demanding a high level of information technology from instructors, students, and universities. This study clarifies the particular difficulties and chances that came with e-learning during the pandemic, but it also raises concerns about how these crucial success factors will affect e-learning in the long run and how they will affect it after the current crisis.

An empirical study of the Indian auto industry was done by Luthra, Garg, and Haleem (2016) in order to determine the effects of key success factors for implementing green supply chain management in the direction of sustainability. The results are applicable to the offshore support vessel industry even though the focus is on a different industry, particularly with regard to sustainability initiatives. The study emphasizes how crucial it is to incorporate sustainable practices into supply chain management and shows how important it is for businesses in this sector to take environmental factors into account in order to be successful and competitive.

In the context of the oil and gas industries, Raut, Narkhede, and Gardas (2017) conducted a study to determine critical success factors of sustainable supply chain management

practices. The results emphasize the significance of competitiveness, which is in line with the goals of the offshore supply vessel sector. The success of businesses in this industry is largely dependent on their level of competitiveness, which is influenced by a number of factors including operational excellence, cost effectiveness, and service quality.

Research on the essential success factors needed in the shipping industry is limited, but it has been applied. Brrar et al. (2023) has conducted an exploratory study of the CSFs of the global shipping industry in the digital era. Through conducting multiple regression analysis on selected critical success factors and organizational performance measures the researchers found that the results of their study are consistent with the dynamic capability theory formed by Porter (Porter, 1991), which believes that an organization must be able to move strategy constraints through creative strategic decision-making in addition to optimizing within them.

A study on the critical success factors of sustainable shipping management conducted by Tran et al. finds that the stakeholder theory is the most influential factor that affects sustainable shipping management (Tran et al., 2020). “A stakeholder refers to any individual or group that maintains a stake in an organization in the way that a shareholder possesses shares” (Fassin, 2009). According to Tran et al. (2020) the theory argues that a shipping company cannot maximize its profits without attending to the social and environmental requirements of all of its stakeholders, which include the community, suppliers, customers, shareholders, and employees.

Queiroz & Mendes (2020) conducted a study on CSFs in the Brazilian OSV industry that included the identification of critical success factors (CSFs) for offshore logistics management and the analysis of their impact on operational performance. The research design used a questionnaire survey to gather data from experts in the field, and descriptive statistics were employed to analyze the CSFs. The findings of the paper can be applied to the Norwegian offshore support industry by providing valuable insights into the critical success factors (CSFs) that are essential for the success of the industry.

2.5 Identified critical success factors

The literature review also worked as a document analysis to collect secondary data. This gave information and knowledge about the industry and relevant success factors. The

identification of success factors relied on the literature review, annual reports from the industry, and secondary data based on the companies' websites. These websites and public reports are listed below in table 2. From the sources we identified 27 factors that was be divided into 11 categories. These categories are explained below. The factors are shown in table 3, section 4. The factors are selected from reports and websites of the relevant companies and are supported by theory from the literature analysis and other sources that are described below in this section.

2.5.1 Strategic management

Using opportunities and adapting to the environment are key components of strategy, which is about matching the business to its organization. The unpredictability and uncertainty of the environment shift along with its dynamics, making the formulation of strategies more challenging. As a result, companies that function in unstable environments need to prioritize flexibility over more conventional, structured strategic planning (Roos et al., 2014, p. 37).

An effective sustainability strategy determines which parts of the company are most impacted by sustainability requirements and expectations after analyzing which parts of the company are affected in general (Innovasjon Norge, 2023). The sustainability strategy of companies is often disclosed in their websites and reports.

Strategic management in the offshore industry is influenced by the high activity level on the Norwegian shelf, driven by growth in the European demand for oil and gas, as well as an increase in demand for shipping services to install offshore wind power across the world (Norwegian Shipowners Association, 2024, p. 9).

2.5.2 Reputation

The intangible value that resides in a company's reputation has the potential to increase added value can be referred to as goodwill. An organization's favorable reputation provides it with a competitive edge as it is hard for rivals to copy or obtain (Brønn, 2019, p. 13). Reputation risks can include not having a credible green transitioning plan or compelling ESG metrics (Tidewater, 2023, p. 39).

2.5.3 Regulatory

In the current competitive environment, industry must maintain its competitiveness while also adhering to regulatory requirements (Tseng & Chiu, 2013). The ability of offshore supply vessel firms to make long-term plans is greatly impacted by the political planning of

Norway's oil and gas industry. Norway is one of the major producers of gas and oil in the world, and through laws and policies, the government controls the sector heavily. In order to maintain environmental protection, safety, and security, offshore support vessels operating in Norway are subject to a complex set of rules and regulations. These rules are in place to protect the fragile marine habitat around Norway's coastline and to preserve the integrity of the country's oil and gas sector.

The International Maritime Organization (IMO) regulations, which establish global guidelines for the design, construction, and operation of ships, including offshore support vessels, are among the main rules that offshore support vessels operating in Norway are required to follow. Numerous topics are covered by these laws, such as safety management, navigation, machinery, and ship stability.
Offshore support vessels operating in Norway are regulated by local regulations established by the Norwegian Maritime Authority (NMA) in addition to international regulations (Norwegian Maritime Authority, n.d.). The NMA is in charge of enforcing Norwegian laws in accordance with international standards and is essential to guaranteeing the security and safety of marine operations in Norwegian waters. The government could introduce new rules that have an impact on the planning, building, and use of offshore supply vessels in an effort to encourage environmentally conscious and sustainable practices in the oil and gas sector. Moreover, the financial sustainability of offshore supply vessel companies can be directly impacted by the tax and subsidy policies implemented by the Norwegian government. The cost structure of the oil and gas sector can be impacted by changes in tax rates or the availability of subsidies for renewable energy projects, which can then have an impact on the demand for offshore supply vessels. Private and public limited companies involved in shipping generally adhere to standard corporate tax rules. However, those meeting specific criteria have the option to be taxed under Norway's tonnage tax regime (The Norwegian Tax Administration, n.d.).

2.5.4 Supplier management

Ship financing, insurance, brokerage, maritime law, ship design, classification, and port services are among the most crucial maritime service providers that shipping companies rely on (Abrahamoglu et al., 2023, p. 26). Supplier management is a critical aspect of the procurement process for any organization (Men et al., 2023). To guarantee that a company's

supply chain operates well, it involves supervising and coordinating all processes linked to the identification, assessment, and administration of suppliers (Eidesvik Offshore ASA, 2023, p. 2). In order to support the strategic aims and objectives of the firm, supplier management must consider a number of relevant elements.

The development and maintenance of supplier relationships is an important component of supplier management. A successful and long-lasting supply chain depends on having solid relationships with its suppliers (Patrucco et al., 2022). Mutual trust, open and honest communication, and a commitment to ongoing growth are all necessary for this. More innovation, reduced expenses, higher supply chain flexibility, and better product quality are all possible outcomes of effective supplier relationship management. But it's also critical to keep in mind the power dynamics in supplier relationships and make sure the company interacts with suppliers in a fair and moral manner. A code of conduct for suppliers may be added in the governance structure of the company (Tidewater, 2023, p. 35).

2.5.5 Bidding process

The ITT/RFP process, which stands for Invitation to Tender/Request for Proposals, is a crucial component of the offshore support industry in Norway. This process is used by companies in the industry to procure goods and services from suppliers, and it plays a significant role in ensuring that the industry operates effectively. The ITT/RFP process involves several steps, including the preparation of tender documents, the invitation of suppliers to submit proposals, the evaluation of these proposals, and the selection of the most suitable supplier (LLC, n.d.).

2.5.6 Innovation

Innovation in the offshore support sector has been essential to progress and improve sustainability, efficiency, and safety in maritime operations. Norwegian shipowners have proven to be innovative and adaptable, and the country's maritime industry is always working to cut emissions. Nine out of ten shipping companies say they have made investments in on-board climate and environmental technology, according to this year's member poll conducted by Norwegian Shipowners Association (2024, p. 23).

New requirements for innovation and technology development are emerging as part of the green shift (Norwegian Shipowners Association, 2024, p. 55). Former requirements and increased environmental focus have led to advances in materials science that resulted in the building of vessels that are stronger, lighter, and more fuel-efficient, improving performance while lowering their environmental effect.

2.5.7 Workforce

There is a strong demand for recruiting and competency in the maritime business. Shipping firms understand the value of having operating experience at sea for future projects, but they also recognize that gaining this competency can be challenging. Talent recruiting has been targeted through advertising, employment fairs, and public awareness of training and recruitment (Norwegian Shipowners Association, 2024, p. 9). Furthermore, emphasis is placed on the necessity of continuing education and training for those working in the maritime business.

2.5.8 Competitiveness

The existence of numerous well-established, loaded with resources companies with a solid market presence is one of the main elements fostering the competitive nature of the Norwegian offshore support market. Over 50 percent of shipping companies anticipate increased profitability in 2024, with the offshore sector leading the way in this optimistic outlook (Norwegian Shipowners Association, 2024, p. 61) These businesses are able to provide a wide range of support services, such as crew management, maintenance, logistics, and vessel supply, since they possess both the technical know-how and the financial stability to do so. Their track record and established presence make it difficult for new competitors to enter the market and win.

The competitive landscape of the Norwegian offshore support market is shaped not only by the existence of well-established firms and technological breakthroughs, but also by the volatile nature of the oil and gas industry (Norwegian Shipowners Association, 2024, p. 61). Changes in global economic conditions, regulatory laws, and oil prices can have a significant impact on the market and the demand for support services. Consequently, in order to stay competitive in the market and navigate through these uncertainties, businesses need to be flexible and agile.

2.5.9 Operations

The profitability and viability of the offshore supply business are largely dependent on the quality of its operations, which also guarantees safety and efficiency. The maintenance of personnel and equipment safety in the offshore supply business is dependent upon the execution of high-quality operations. Because of their very nature, offshore operations come with special hazards and obstacles, such as the need to operate large gear in difficult environments and deal with complicated logistics (Aas et al., 2009). Maintaining high standards of quality in operations is essential to avoiding mishaps, cutting down on downtime, and safeguarding both human life and the environment.

Furthermore, the entire success and long-term survival of the offshore supply sector depend heavily on the quality of its operations. Customers and stakeholders expect products and services to fulfill high quality standards in today's global marketplace. Businesses that continuously provide exceptional quality in their operations have a greater chance of winning over customers' trust and loyalty, gaining a competitive advantage, and developing a solid reputation in the sector.

2.5.10 Financial

Due to the high capital requirements of shipping operations, lenders and financial service providers play a crucial role. Furthermore, the shipping markets are highly volatile, which puts high demands on financial players' ability to assess risk and understand the market (Abrahamoglu et al., 2023, p. 28). The offshore sectors have reported a challenging situation regarding access to capital, but the situation is improving. The forecast for shipping businesses' access to financing is now the most optimistic since 2015 (Norwegian Shipowners Association, 2024, p. 62).

2.5.11 Environment

The updated climate strategy has been adopted by the International Maritime Organization (IMO). According to the plan, global shipping must achieve net zero greenhouse gas emissions by 2050 (Norwegian Shipowners Association, 2023). Even for maritime companies that operate in Norway, cutting emissions does not always give them a competitive edge in

the short run. This is due to the fact that most of the goals are far off in the future, which means that many businesses won't act until it is absolutely required.

Table 2 Websites and reports used in the document analysis

Aurora Offshore	https://auroraoffshore.com
Boa Offshore	https://www.boa.no
	https://www.boa.no/wp-content/uploads/2023/10/2022-Boa-Offshore-AS-annual-report.pdf
DOF	https://www.dof.com
	https://assets-global.website-files.com/629f1b36bee3b058907852a0/662669bc95727c8f3355e100_DOF%20Integrated%20Annual%20Report%202023%20V1.01%20WebRes.pdf
Eidesvik	https://eidesvik.no
	https://eidesvik.no/wp-content/uploads/2024/02/EIOF-Q4-2023.pdf
Golden Energy Offshore	https://www.geoff.no
	https://assets-global.website-files.com/5d5458e4865d647faafd9aa8/6622bcc1932203773bdf471e_GEOS%20FS%202023%20-%20Financial%20Statement%2019042024.pdf
Havila Shipping	https://www.havilashipping.no
	https://www.havilashipping.no/upload_images/1F82AC45D0F2460491A2F9B6EEB2E7D0.pdf
Island Offshore	https://www.islandoffshore.com
Olympic Subsea	https://www.olympic.no
	https://issuu.com/cannas/docs/2023_olympic_annual?fr=sNDFlNTcyMDM3Nzg
Østensjø	https://ostensjo.no
	https://sustainability.ostensjo.no
Remøy Shipping	https://www.remoyshipping.no
	https://www.siemoffshore.com

Siem Offshore	https://assets-global.website-files.com/5fa3e069dd4a78ac73fe3a0f/6622110a7fea79ba99f2c7b6_SIOFF%20Annual%20Report%202023.pdf
Simon Møkster Shipping	https://www.mokster.no/#Our-fleet
	https://assets-global.website-files.com/5e9eaf9c71a16bb9bef6974b/66013bfacb76995e0744a186_SMS%20ESG%20Report%202023%20-1.pdf
Solstad Offshore	https://www.solstad.com/
	https://www.solstad.com/wp-content/uploads/2024/04/Solstad-2023-report_21_en.pdf
Ugland Offshore	https://www.jjuc.no/home
	https://www.jjuc.no/Dokumenter/Annual%20Report/Annual%20Report%20-%202022.pdf
Viking Supply Ships	https://vikingsupply.com
	https://storage.mfn.se/40b2c61b-87ba-4599-8284-c61d76490616/annual-report-2023.pdf

3 Data and methodology

A survey questionnaire was developed to measure the impacts of CSFs in the OSV industry. Collected data has been analyzed with the help of descriptive statistics. Details are provided in following sub-sections.

3.1 Data collection

In order to shed light on the research questions for this thesis, it was necessary to obtain an overview of all relevant shipping companies in Norway that operate within the supply industry. With the help of informants working at Simon Møkster shipping we identified 15 different Norwegian OSV companies that operate within the supply industry on the Norwegian continental shelf. There was also conducted an additional search in the Norwegian Shipowners Association members list. Since membership in this association is optional, certain Norwegian OSV companies may not be among its members. To find publications mentioning Norwegian OSV companies that weren't already identified, a second search was conducted at Tradewinds. The additional searches did not result in any other companies being

added to the list, and the number remained at 15. This number is based on our knowledge and may differ from the number of registered companies.

To get some input on which organizational sector of the OSV industry that get much attention, we conducted an open interview with a researcher that has great knowledge about the industry. This gave valuable insights of the industry and to understand what seems to be the focus areas for the businesses to reach their organizational goals.

A surveys purpose is to gather measurable data from a particular population (Fanning, 2005). A questionnaire survey was made to know the impact of CSFs in the OSV industry. This was made using "Nettskjema", an online survey tool developed by the University of Oslo (Universitetet i Oslo, n.d.). An in-depth literature review was conducted before developing a structured questionnaire. The questionnaire contained 27 factors in addition to questions about company size and the informant's role in the company. The survey used a Likert-type scale from 0 to 5, where 0= no opinion, 1= no influence, 5= high influence. The survey was designed under the assumption that respondents possess prior knowledge of the subject matter. To mitigate potential time constraints for respondents, detailed explanations of each individual critical success factor were excluded from the survey (Jacobsen, 2018, p. 310).

The survey was electronically sent out to 15 companies in the OSV industry addressing directors, managers, and consultants in financial, operational and HSEQ (health, safety, environment, quality) departments. The survey was sent out through email. Due to the difficulty in getting personal email addresses or phone numbers for employees in the respective companies, the survey was sent to the office front desk, which forwarded the email to the relevant employees. After sending out the email, we received two valis responses. A second email was sent out with a reminder of the survey. This resulted in receiving additional two valid responses.

Through LinkedIn we were able to track down individuals with relevant positions in the OSV companies. We messaged them about the research and asked if they would participate in the survey. From the messages sent via LinkedIn we received two valid answers to the survey. Through the people from LinkedIn and other acquaintances we were able to get some

additional email addresses directly to people in relevant positions in the OSV companies. We did not receive any response to the emails sent to the additional persons.

Even though the use of surveys has increased the last years. At the same time, the response rate decreases. According to Jacobsen (2018, p. 311) there is a strong likelihood of a connection between the rising use of survey questionnaires and the decreasing response rate. A low response rate in surveys can introduce systematic bias, compromising the reliability and validity of the study's findings. When only a small subset of the target population responds to a survey, those who do participate may not represent the broader population accurately. This selective participation can skew results, leading to misleading conclusions. In our study, we have taken proactive measures to address the potential challenge posed by a low response rate. Firstly, we implemented targeted outreach strategies to maximize participant engagement. This included personalized invitations and follow-up reminders. By doing this, we have tried to mitigate the impact of low response rates on the integrity and validity of our study, thereby enhancing the credibility and reliability of our research outcomes. In total we received 6 valid surveys (completed) from industry experts, which is under the normal accepted level of response rate (Jacobsen, 2018, p. 310). The potential consequences of the low response rate on this study will be further elaborated upon in section 6.

We have used secondary data to build a theoretical basis for the survey and the analysis. Among other things, we have made use of public documents and reports from the relevant companies. This includes reports and websites. This was done to identify critical success factors for the OSV companies, based on what they emphasize and focus on in their reports. This gives a clear view on what the companies see as important to succeed in their industry.

Documents can often be objective and differ from interviews in that they say something about what has actually been done (Jacobsen, 2018, p. 170). Secondary data does not always come directly from the source but is often prepared by someone else. Often this information is collected for a different purpose than what we want to use it for (Jacobsen, 2018, p. 140). In document analyses, the fundamental question therefore becomes whether we can trust the sources, i.e. the person who produced the document. Often, we do not know how data has been collected, or whether it has been manipulated to suit certain purposes. The fact that document investigations are based on information that is not spontaneous can mean that the

information is distorted to give a special impression, but also that it is more thought out and processed (Jacobsen, 2018, p. 172).

3.2 Reliability and validity

A survey should be a method to collect empirical evidence. Regardless of the empirical evidence, it should satisfy the requirements of being valid and relevant (valid) and reliable and trustworthy (reliable) (Jacobsen, 2018, p. 16). By validity and relevance, we mean that the information we collect provides answers to the question or questions we have asked. In the scientific method, validity and relevance are divided into internal and external validity. Internal validity depends on whether we have coverage in our data for the conclusions we draw. External validity and relevance depend on whether results from a limited area are also valid in other contexts, i.e. whether the result of the survey can be generalized to apply in other contexts. By reliability and credibility we mean that the survey must be trustworthy (Jacobsen, 2018, p. 17). The reliability of the research that has been carried out will be discussed in this chapter based on whether the results it given can be reproduced at another time by other researchers.

When it comes to the validity of a survey, according to Jacobsen (2018, p. 228), there are usually two important issues that one has to deal with, have I got hold of the right sources and have the sources contributed true information? All the informants we have based this investigation on are so-called first-hand sources, and this means that they themselves have experience from the industry this thesis focuses on (Jacobsen, 2018, p. 177). According to Jacobsen (2018, p.191), this means that a greater degree of trust can added to the source. We are therefore of the understanding that we have obtained the right sources on the basis that all informants have contributed what I consider to be relevant information that has helped to shed light on the thesis' problem.

Whether each individual informant has given the correct information is difficult for us to determine. There are several factors that can contribute to informants not giving the correct information. A source may have various interests that may lead them to lie, which is also not entirely unthinkable in this context (Jacobsen, 2018, p. 177). Even if informants have been carefully chosen from the right company, the role of the informants in the company can help to change their answers. The informants may feel that factors related to their area of the

company may be of higher importance than other areas. This does not provide an objective assessment of the critical success factors.

In summary, there are several aspects of the implementation of this task that can be thought to have an effect on the validity and reliability of the task. What we have highlighted is a potential for informants to contribute false information as well as not choosing the right informants to get an objective assessment of the factors.

3.3 Descriptive statistics

This study implements the use of descriptive statistics to measure the importance of the CSFs of the OSV industry. A variety of statistical approaches and strategies are included in descriptive statistics, which are designed to organize, display, and clarify the features that are fundamental to a sample (Marshall & Jonker, 2010, p. 3). These techniques, which all aim to provide a clear overview of the characteristics of the data, comprise both numerical processes and graphical representations like bar charts, histograms, frequency polygons, and pie charts. Descriptive statistics also include measures of dispersion, such as spread, and central tendency, such as average, providing a thorough picture of the characteristics of the sample (Marshall & Jonker, 2010, p. 5).

Descriptive statistics was used by Queiroz & Mendes (Queiroz & Mendes, 2020) to clarify the data in their study on critical success factors in the Brazilian OSV industry. By using the same method in our study, the data gives us a basis for comparison between the industries in the two respective countries.

4 Findings

4.1 Norwegian OSV companies

15 Norwegian OSV companies that operates within the supply industry on the Norwegian continental shelf were identified. This was done through the help of workers in the industry and searches at Tradewinds and in the Norwegian Shipowners Association list. The 15 companies are listed below:

Aurora Offshore
Boa Offshore
DOF
Eidesvik
Golden Energy Offshore
Havila Shipping
Island Offshore
Olympic Subsea
Østensjø
Remøy Shipping
Siem Offshore
Simon Møkster Shipping
Solstad Offshore
Ugland Offshore
Viking Supply Ships

4.2 Findings from the document analysis

We chose to analyze the websites and public reports from the relevant companies. This was done to get an overview of factors that are clearly highlighted as important focus areas for the companies, but also factors that are not mentioned in particular. The documents and homepages gave a clear picture of relevant factors to extract. These factors are summarized below in table 3. The factors collected in the document analysis was used as a foundation for the questionnaire survey.

Table 3 Norwegian offshore support vessel (OSV) industry critical success factors (CSFs)

Category	CSF	Critical success factor
Strategic management	1	Strategies to avoid lay-up in times of low demand
	2	Sustainability strategies
Reputation	3	Business ethics
	4	Transparency of business
	5	Board composition
Regulatory	6	Current legislation
	7	Political information to support planning (contract opportunities)
	8	Taxation policies implemented by the government
Supplier management	9	Availability of high-quality suppliers
	10	Maintenance of supplier relationships
Bidding process	11	Bidding bureaucracy and its impact on productivity
Innovation	12	The utilization of data systems to optimize the planning operations
	13	Tools and techniques to identify improvements
Workforce	14	Health and safety of employees
	15	Qualified personnel
	16	Cooperation with universities
Competitiveness	17	Knowledge of competitors (strengths and weaknesses)
	18	Cost efficiency
Operations	19	Quality of operations
	20	Risk reduction in operations
	21	The use of key performance indicators to assess operations
Financial	22	Difficulty in obtaining financing
Environment	23	Emission reduction
	24	ESG reporting

25	Specialists in environmental issues
26	Environmental licensing costs
27	Environmental certification ISO14001

4.3 Ranking of the CSFs

4.3.1 Distribution of the respondents

The data collected from the expert questionnaire were analyzed using IBM SPSS software (Queiroz & Mendes, 2020). From the data collected, we could see that 16,7 percent worked in a company with up to 50 employees, 66,7 percent worked in companies with 100-499 employees and 16,7 percent of respondents worked in companies more than 1000 employees. (Figure 1). The respondents' roles in the companies were director (33,3%) operations manager (16,7%), commercial manager (16,7%), financial manager (16,7%) and chartering manager (16,7%). (Figure 2).

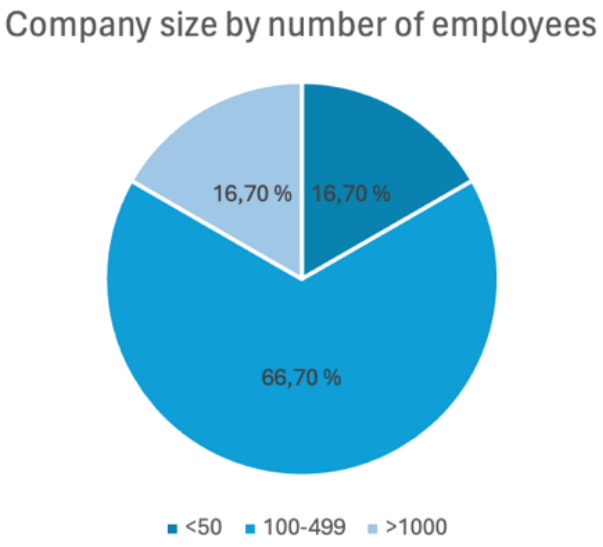

Figure 1 Company size by number of employees

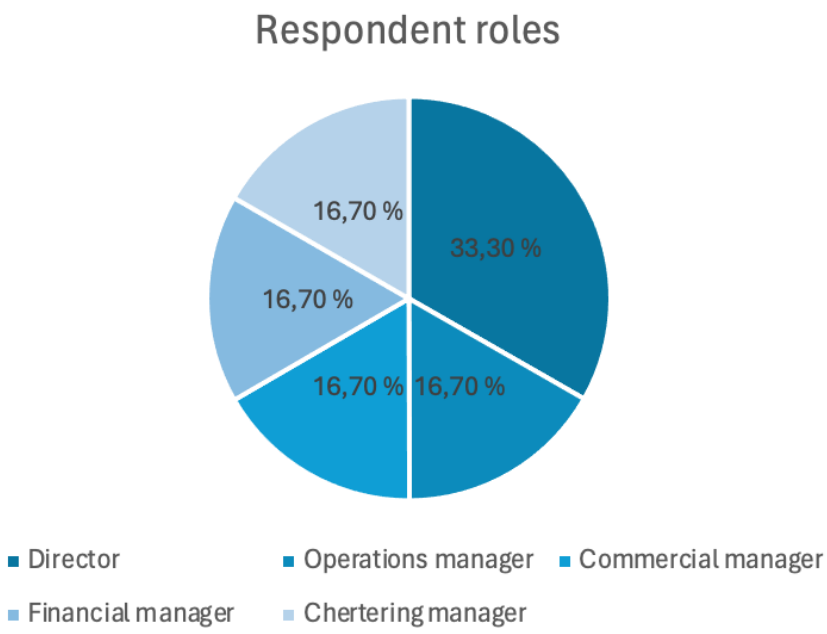

Figure 2 Respondent roles

4.3.2 Descriptive statistics for critical success factors

This study employed descriptive statistics based on the five-point Likert scale to assess the importance of the CSFs identified (rated by the experts). The average of the CSFs and their corresponding rankings are shown in table 4.

As the table shows, a factor in the "operations" category CSF 19 (quality of operations) is ranked first. This top-ranking factor shows the importance of maintaining high operational standards in maritime activities. Skilled personnel play a crucial role in ensuring safety, efficiency, and effectiveness, thereby upholding industry standards, and ensuring long-term success. CSF 15 (qualified personnel) from the "workforce" category and CSF 20 (risk reduction in operations) from the "operations" category is ranked second and third. Ranked second, the presence of qualified personnel is crucial for minimizing risks, adhering to regulatory requirements, and delivering on customer expectations. Their expertise directly impacts operational performance and the reputation of maritime businesses. Third on the list, excellent operations depend on efficient risk management. Businesses could reduce the chance of accidents and downtime by minimizing the risks and difficulties that come with operating in the maritime sector. This will build trust and maintain the industry's reputation. These rankings clearly show that in the dynamic world of maritime operations, where safety, efficiency, and reliability are extremely important, these factors aren't only an observation but

a strategic necessity. Ranked fourth, cost efficiency (CSF 18) is essential for ensuring competitiveness and financial sustainability. Managing operational expenses effectively allows businesses to optimize resources and adapt to market dynamics. Fifth in importance, sustainability strategies are becoming increasingly critical in navigating the evolving landscape of environmental regulations and customer expectations. Balancing long-term environmental goals with immediate business pressures requires strategic foresight and adaptability.

CSF 16 (cooperation with universities) was ranked last and CSF 26 (environmental licensing cost) second last. While cooperation with universities and environmental licensing costs are relevant, they rank lower due to their limited immediate impact and financial significance compared to other factors.

Table 4 Mean and rank for critical success factors (CSFs) identified

Category	CSF	Description	Mean	Standard Deviation	Rank
Strategic management	1	Strategies to avoid lay-up in times of low demand	3.8333	1.16905	9
	2	Sustainability strategies	4.3333	.81650	5
Reputation	3	Business ethics	3.8333	.75277	11
	4	Transparency of business	3.6667	.81650	14
	5	Board composition	2.8333	1.47196	24
Regulatory	6	Current legislation	3.1667	1.16905	21
	7	Political information to support planning (contract opportunities)	2.6667	1.21106	25
	8	Taxation policies implemented by the government	3.5000	1.04881	16
Supplier management	9	Availability of high-quality suppliers	4.0000	1.09545	7
	10	Maintenance of supplier relationships	4.0000	.89443	6
Bidding process	11	Bidding bureaucracy and its impact on productivity	3.3333	1.03280	19
Innovation	12	The utilization of data systems to optimize the planning operations	3.0000	1.26491	23
	13	Tools and techniques to identify improvements	3.3333	1.21106	18
Workforce	14	Health and safety of employees	3.8333	1.47196	8
	15	Qualified personnel	4.6667	.51640	2
	16	Cooperation with universities	2.5000	1.37840	27
Competitiveness	17	Knowledge of competitors (strengths and weaknesses)	3.8333	1.16905	10
	18	Cost efficiency	4.3333	1.21106	4
Operations	19	Quality of operations	4.8333	.40825	1
	20	Risk reduction in operations	4.5000	.83666	3
	21	The use of key performance indicators to assess operations	3.3333	.51640	17
Financial	22	Difficulty in obtaining financing	3.6667	1.36626	13
Environment	23	Emission reduction	3.5000	1.37840	15
	24	ESG reporting	3.1667	1.16905	20
	25	Specialists in environmental issues	3.0000	1.09545	22
	26	Environmental licensing cost	2.5000	1.76068	26
	27	Environmental certification ISO14001	3.6667	1.21106	12

4.3.3 Skewness and Kurtosis

This study uses skewness and kurtosis to provide insights into the distribution of the data and understand its underlying characteristics (Brys et al., 2004). The literature benchmark for skewness is typically within the range of -1 to +1, indicating moderate skewness, while for kurtosis, a benchmark of 3 represents mesokurtic (normal) distribution, with values higher or lower indicating leptokurtic (heavy-tailed) or platykurtic (light-tailed) distributions, respectively (D'Agostino & Belanger, 1990). The skewness and kurtosis data are presented in table 5.

In analyzing the data, it was observed that both skewness and kurtosis values deviated from the acceptable ranges typically associated with a normal distribution (D'Agostino & Belanger, 1990). Specifically, the skewness ranged from -2.449 to 0.968, indicating significant asymmetry in the data distribution, while kurtosis varied from -2.052 to 6.000, suggesting notable departures from the expected peak of a normal distribution. A skewness value of -2.449 indicates significant negative skewness, meaning the distribution has a long tail on the left side and a concentration of data on the right. This suggests that the data contains a higher frequency of relatively larger values and a few extremely small values. On the other end, a skewness value of 0.968 indicates moderate positive skewness, where the distribution is asymmetrically shifted to the left with a tail extending to the right. This means that the data contains more low values than high. A kurtosis value of -2.052 suggests that the data has a flatter shape, meaning it doesn't have many extreme values or outliers. On the other hand, a kurtosis value of 6.000 means that the data is more peaked in the middle and has more outliers at the ends. This means there are more extreme values compared to a typical dataset.

Possible explanations for the observed skewness and kurtosis deviations include the heterogeneous nature of the sample population, measurement errors, or the presence of outliers (D'Agostino & Belanger, 1990). Additionally, it is important to acknowledge that the phenomena under study may inherently follow non-normal distributions, warranting alternative analytical approaches. Given the deviations from normality assumptions, the robustness and generalizability of the study findings may be impacted. Caution will be exercised in the interpretation of findings, with due consideration given to the limitations associated with skewness and kurtosis deviations.

Table 5 Skewness and kurtosis for the CSFs

			Skewness		Kurtosis	
Category	CSF	N	Statistics	Standard deviation	Statistics	Standard deviation
Strategic management	1	6	-.668	.845	-.446	1.741
	2	6	-.857	.845	-.300	1.741
Reputation	3	6	.313	.845	-.104	1.741
	4	6	.857	.845	-.300	1.741
	5	6	.418	.845	-.859	1.741
Regulatory	6	6	.668	.845	-.446	1.741
	7	6	-.075	.845	-1.550	1.741
	8	6	.000	.845	-.248	1.741
Supplier management	9	6	-1.369	.845	2.500	1.741
	10	6	.000	.845	-1.875	1.741
Bidding process	11	6	.666	.845	.586	1.741
Innovation	12	6	-.889	.845	-.781	1.741
	13	6	-1.952	.845	3.657	1.741
Workforce	14	6	-.711	.845	-2.052	1.741
	15	6	-.968	.845	-1.875	1.741
	16	6	-1.375	.845	2.355	1.741
Competitiveness	17	6	-.668	.845	-.446	1.741
	18	6	-1.952	.845	3.657	1.741
Operations	19	6	-2.449	.845	6.000	1.741
	20	6	-1.537	.845	1.429	1.741
	21	6	.968	.845	-1.875	1.741
Financial	22	6	-1.934	.845	4.554	1.741
Environment	23	6	-1.375	.845	2.355	1.741
	24	6	-1.586	.845	2.552	1.741
	25	6	-1.369	.845	2.500	1.741
	26	6	-.495	.845	-1.925	1.741
	27	6	-.075	.845	-1.550	1.741

4.3.4 Correlation analysis

This study employed Pearson's correlation coefficients (Kess et al., 2010; Quieroz & Mendes, 2020) to examine relationships among Critical Success Factors (CSFs). The correlation coefficient ranges from -1 to 1. Values closer to 1 indicate stronger positive relationships, while values closer to -1 indicate stronger negative relationships (Sedgwick, 2012). Table 5 shows the correlations. Although there were several noteworthy correlations found in the CSF correlation matrix, it is important to note that the interpretations may be deceptive due to the small sample size of only six respondents. The correlation data is presented in table 6.

However, the study points to possible dependencies or connections between CSFs, providing insight into the possible connections between many factors that affect success in a given environment. For example, a strong positive correlation of 0.908 indicates a considerable relationship between CSF 4 (Transparency of business) and CSF 6 (Current legislation). In the same way, there may be a relationship between these variables given the strong positive link (0.956) between CSF 19 (quality of operations) and CSF 22 (difficulty in obtaining finance). These results highlight the interdependence of CSFs, suggesting that modifications in one CSF are probably going to be reflected in corresponding adjustments in the associated CSF.

A noticeable inverse relationship—where one CSF tends to decline as the other grows—is suggested by the considerable negative correlation of -0.555 between CSF 4 (Transparency of business) and CSF 5 (Board composition). These negative correlations could point to possible conflicts or trade-offs between various success criteria, which would require for full understanding in order to perform a thorough assessment. The strong positive correlation of 0.839 between CSF 16 (Collaboration with universities) and CSF 7 (Political information to support planning) emphasizes how closely connected they are. Furthermore, the CSFs 23 (Emission reduction), 24 (ESG reporting), and 25 (Specialists in environmental issues) have strong positive correlations that range from 0.927 to 1. These correlations highlight the ongoing relationship between the different CSFs and show how they work together to influence success in the particular setting.

Table 6 Pearson correlations for the CSFs

	1	2	3	4	5	6	7	8	9
CSF 1	1								
CSF 2	.070	1							
CSF 3	.644	.434	1						
CSF 4	.349	.200	.868*	1					
CSF 5	.097	-.111	-.211	-.555	1				
CSF 6	.463	.349	.947**	.908*	-.213	1			
CSF 7	-.047	.135	.585	.674	-.150	.612	1		
CSF 8	.245	-.234	.380	.234	.583	.408	.630	1	
CSF 9	.625	-.224	.485	.224	.620	.469	.302	.870*	1
CSF 10	.765	.274	.594	.274	.304	.574	-.185	.213	.612
CSF 11	.387	.553	.857*	.870*	-.614	.773	.586	.000	.000
CSF 12	.271	.387	.630	.387	.322	.541	.783	.754	.577
CSF 13	.188	.674	.731	.539	.037	.659	.773	.472	.302
CSF 14	-.252	.222	-.030	-.222	.538	-.097	.524	.583	.248
CSF 15	-.442	.316	-.171	-.316	.439	-.221	.426	.369	.000
CSF 16	-.310	.533	.482	.533	-.148	.559	.839*	.346	.000
CSF 17	.268	.908*	.644	.349	.097	.610	.235	.082	.156
CSF 18	.612	-.539	.293	.135	.486	.235	.227	.787	.905*
CSF 19	-.489	-.400	-.759	-.800	.610	-.768	-.135	.234	.000
CSF 20	-.511	.000	-.476	-.586	.568	-.511	.197	.342	.000
CSF 21	.110	.158	.171	-.158	.877*	.221	.213	.739	.707
CSF 22	-.292	-.239	-.648	-.837*	.762	-.710	-.201	.279	.134
CSF 23	-.310	.000	-.482	-.711	.739	-.559	.000	.346	.132
CSF 24	-.268	-.279	-.417	-.559	.717	-.463	.188	.571	.312
CSF 25	-.156	-.224	-.485	-.671	.620	-.625	.000	.348	.167
CSF 26	.340	-.278	.226	.000	.656	.146	.469	.921**	.830*
CSF 27	.094	-.067	-.073	-.337	.636	-.235	.318	.630	.452

Table 6 continued

	10	11	12	13	14	15	16	17	18
CSF 1									
CSF 2									
CSF 3									
CSF 4									
CSF 5									
CSF 6									
CSF 7									
CSF 8									
CSF 9									
CSF 10	1								
CSF 11	.217	1							
CSF 12	.177	.459	1						
CSF 13	.185	.693	.914*	1					
CSF 14	-.304	-.088	.752	.598	1				
CSF 15	-.433	-.125	.612	.533	.965**	1			
CSF 16	-.162	.562	.688	.839*	.542	.562	1		
CSF 17	.574	.552	.541	.753	.213	.221	.559	1	
CSF 18	.369	-.107	.392	.045	.150	-.107	-.240	-.235	1
CSF 19	-.548	-.791	.000	-.270	.610	.632	-.178	-.489	.135
CSF 20	-.535	-.463	.378	.197	.893*	.926**	.260	-.102	.000
CSF 21	.433	-.250	.612	.426	.614	.500	.281	.442	.426
CSF 22	-.327	-.756	.116	-.161	.663	.661	-.212	-.292	.201
CSF 23	-.324	-.562	.344	.120	.838*	.843*	.053	-.062	.120
CSF 24	-.383	-.552	.406	.094	.833*	.773	.062	-.268	.377
CSF 25	-.408	-.530	.289	.000	.744	.707	-.132	-.312	.302
CSF 26	.127	-.110	.718	.375	.656	.440	.124	-.049	.844*
CSF 27	-.185	-.213	.653	.364	.860*	.746	.120	-.047	.500

Table 6 continued

	19	20	21	22	23	24	25	26	27
CSF 1									
CSF 2									
CSF 3									
CSF 4									
CSF 5									
CSF 6									
CSF 7									
CSF 8									
CSF 9									
CSF 10									
CSF 11									
CSF 12									
CSF 13									
CSF 14									
CSF 15									
CSF 16									
CSF 17									
CSF 18									
CSF 19	1								
CSF 20	.878*	1							
CSF 21	.316	.463	1						
CSF 22	.956**	.875*	.472	1					
CSF 23	.889*	.954**	.562	.956**	1				
CSF 24	.908*	.920**	.552	.918**	.931**	1			
CSF 25	.894*	.873*	.354	.935**	.927**	.937**	1		
CSF 26	.417	.475	.660	.499	.536	.729	.622	1	
CSF 27	.674	.790	.533	.766	.839*	.895*	.905*	.844*	1

*. Correlation is significant at the 0.05 level. **. Correlation is significant at the 0.01 level

5 Discussion

5.1 Contribution to Literature

The offshore support vessel (OSV) industry, particularly within the Norwegian continental shelf (NCS), operates in a dynamic and challenging environment characterized by fluctuating oil prices, evolving regulatory frameworks, and technological advancements. Understanding the critical success factors (CSFs) that drive performance and competitiveness in this context is essential for industry stakeholders seeking to navigate these complexities effectively. This thesis contributes to the existing literature by offering a framework for identifying and categorizing CSFs in the OSV sector in Norway.

Building on prior research in related fields such as supply chain management, e-learning, and sustainable shipping management, this study identifies 27 CSFs spanning strategic management, reputation, regulatory compliance, supplier management, and innovation. This categorization provides a structured approach to understanding the nature of success within the OSV industry, highlighting the various factors that influence organizational performance (Alqahtani & Rajkhan, 2020; Tran et al., 2020; Raut et al., 2017).

The analysis of expert surveys and document data allows for the prioritization of these factors based on their perceived importance within the industry. Factors such as quality of operations, qualified personnel, and risk reduction emerge as top priorities, reflecting the industry's emphasis on safety, efficiency, and reliability. Additionally, the inclusion of factors related to sustainability management and environmental concerns reflects the growing recognition of the need for responsible business practices in response to global trends and stakeholder expectations (McDuffie et al., 2020).

Comparing with Queiroz & Mendez (2020) research on the critical success factors in the Brazilian OSV industry we get some interesting insights into the industry. In the Brazilian study, two factors related to policies, specifically CSF 2 (current legislation and legal insecurity) and CSF 3 (taxation imposed by the government), were ranked first and second, indicating their significant impact on companies' flexibility, operations, and decision-making processes. This suggests that regulatory and tax-related challenges are perceived as top priorities for companies operating in the maritime sector. CSF 20 (strategies to optimize

costs) from the "strategies" category was ranked third, emphasizing the sector's need to efficiently utilize resources due to their high costs. This aligns with the importance placed on cost efficiency in the maritime industry, where operational expenses can significantly impact profitability. Ranked fourth was CSF 23 (quality of the workforce). CSF 15 (environmental licensing costs) was ranked fifth, indicating the considerable effort required to comply with environmental regulations and operate companies sustainably. This reflects the growing emphasis on environmental sustainability in the maritime industry and the associated costs and challenges.

It's interesting to note that in our study, CSF 2 (sustainability strategies) was ranked fifth, suggesting a discrepancy in the perceived importance of sustainability initiatives between the two studies. This could reflect differences in industry contexts, regulatory environments, or stakeholder priorities. Cooperation with universities is ranked last in both studies, indicating an acceptance on its relatively low priority in the maritime industry. This ranking may be attributed to several factors: immediate operational concerns take precedence, focusing on factors like safety, efficiency, and cost management; perceived return on investment, with cooperation initiatives requiring upfront investment for long-term benefits; industry culture and tradition favoring practical skills over formal academic partnerships; potential lack of awareness or understanding regarding the benefits of collaboration with universities; and resource constraints, where companies may prioritize initiatives that offer more immediate and tangible returns given limited resources. While cooperation with universities holds promise for driving innovation and talent development, its current ranking suggests that companies prioritize other factors that offer more immediate benefits to their operations and strategic objectives.

Our results support the observations of Tran et al (2020). As we have shown in our examination of the success factors "workforce," "supplier management," and "environment," a shipping company cannot maximize its profits if it does not attend to the social and environmental demands of its stakeholders. Our document analysis highlights the importance of competitiveness and environmental concerns as critical drivers, which is consistent with other studies conducted in different industries. The focus on incorporating sustainability initiatives into supply chain management strategies aligns with the claims made in research studies like Luthra et al.´s (2016) study of the Indian auto industry and Raut et al.'s (2017) study of sustainable supply chain management practices in the oil and gas industry. The

combination of insights highlights the global necessity for businesses in a variety of industries, including the offshore support vessel industry, to give priority to sustainable practices in order to successfully navigate the complexity of modern market dynamics and ensure long-term commercial success.

5.2 Implications for industry

The implications of the findings for industry and policy are far-reaching, impacting stakeholders ranging from OSV companies to regulatory bodies and policymakers.
For industry stakeholders, the identification and prioritization of CSFs underscore the importance of strategic planning and investment in key areas to drive long-term success. Factors such as strategic management strategies to avoid lay-ups, sustainability management, and regulatory compliance are critical for companies seeking to adapt to changing market conditions and regulatory requirements. This necessitates a proactive approach to decision-making and resource allocation, with a focus on enhancing operational efficiency, reducing risk, and demonstrating commitment to sustainability.

The emphasis on workforce management factors highlights the important role of human capital in driving organizational performance within the OSV industry. Investments in training, safety initiatives, and collaboration with educational institutions are essential for creating a skilled and motivated workforce capable of meeting the industry's evolving needs (Norwegian Shipowners Association, 2024). From a policy perspective, the findings emphasize the importance of regulatory frameworks in shaping industry behavior and practices. Clear and consistent regulations related to environmental licensing, taxation policies, and political stability are essential for providing a conducive business environment that supports industry growth and sustainability (Tseng & Chiu, 2013). Policymakers must collaborate with industry stakeholders to develop policies that strike a balance between promoting economic development and safeguarding environmental and social interests.

Additionally, the focus on innovation and technology adoption highlights the need for supportive policy measures to foster a culture of innovation within the industry. Incentives for research and development, collaboration between industry and academia, and regulatory support for emerging technologies are essential for driving innovation and enhancing competitiveness in the global market (Norwegian Shipowners Association, 2024).

6 Conclusion

In this thesis, we have investigated the critical success factors of the Norwegian OSV industry. By using a mixed-methods approach, have identified the Norwegian offshore support vessel companies that operates on the Norwegian continental shelf and 27 critical success factors for the industry which industry experts then has ranked according to importance.

Fifteen Norwegian Offshore Supply Vessel (OSV) companies operating within the supply industry on the Norwegian continental shelf were identified. This process involved collaboration with industry workers and searches conducted on platforms such as Tradewinds and the Norwegian Shipowners Associations members list.

The document analysis conducted for the literature review gave valuable insights into the critical success factors (CSFs) influencing the offshore support industry. Drawing from sources such as industry reports and company websites, a total of 27 CSFs were identified and categorized into 11 categories. These categories include a wide range of factors divided into strategic management, reputation, regulatory, supplier management, bidding process, innovation, workforce, competitiveness, operations, financial, and environment. Each CSF represents a crucial part of maritime operations, reflecting the nature of the industry and the challenges faced by businesses operating within it.

The ranking of Critical Success Factors (CSFs) in maritime operations shows the importance of maintaining high operational standards, with quality of operations emerging as the top priority. Qualified personnel and risk reduction in operations closely follow, highlighting their essential roles in ensuring safety, regulatory compliance, and customer satisfaction. Furthermore, the emphasis on cost efficiency and sustainability strategies reflects the need for businesses to balance financial considerations with long-term environmental goals in a dynamic industry landscape. While cooperation with universities and environmental licensing costs holds relevance, their lower rankings indicate their limited immediate impact and financial significance compared to other critical factors. Overall, these rankings emphasize the strategic necessity for maritime businesses to prioritize factors that contribute

to safety, efficiency, and reliability in navigating the complexities of the maritime sector and sustaining long-term success.

6.1 Limitations

There are various limitations to the study that need be considered. First, there is a lack of comparative literature, which makes it difficult to draw valid comparisons with previously conducted studies because there aren't enough of them. This lack of benchmarking limits the findings' generalizability and hinders the capacity to draw comprehensive conclusions.

Furthermore, the dataset's skewness and kurtosis deviations cast doubt on the reliability of statistical tests that depend on the normal distribution assumption. These variations might compromise the validity and applicability of study results, requiring careful interpretation to prevent drawing false conclusions.

In addition, the study struggles with a low response rate—just six valid surveys from professionals in the field were received, which is below acceptable limits. The low response rate raises the possibility of bias, which might affect the reliability and validity of the results. Several directions for future study could solve these shortcomings and deepen our understanding of critical success factors in the offshore support vessel industry.

6.2 Future research

Future studies could examine how the Critical Success Factors (CSFs) that have been identified can be applied to other Offshore Supply Vessel (OSV) networks, like those in the Gulf of Mexico and Brazil. Also, examining CSFs in various oil and gas business segments could provide important insights into possibilities and limitations unique to this industry.

To provide a more nuanced understanding of the many Critical Success Factors (CSFs) identified in the study and their impact on maritime operations, future research should explore them in greater detail. In-depth research into the specific procedures by which these variables affect operational results can clarify how important they are and direct the industry's strategic decision-making. Researchers can learn more about the underlying causes of each CSF, contextual variations, and possible cooperation or compromises between various factors by performing thorough examinations of each one. The results of this more thorough investigation can help shape specific actions and regulations that improve safety, support sustainability, and maximize operational performance in the maritime industry.

Furthermore, resolving methodological issues can improve the reliability and reliability of study findings in the future. Examples of these issues include different modeling strategies for non-normal data distributions. By addressing these limitations and exploring these directions for further investigation, academics may improve understanding in the field of maritime operations and assist in the formulation of successful strategies for industry development.

7 References

Aas, B., Gribkovskaia, I., Halskau Sr., O., & Shlopak, A. (2007). Routing of supply vessels to petroleum installations. *International Journal of Physical Distribution and Logistics Management*, *37*(2), 164–179. Scopus. https://doi.org/10.1108/09600030710734866

Aas, B., Halskau, Ø. S., & Wallace, S. W. (2009). The role of supply vessels in offshore logistics. *Maritime Economics and Logistics*, *11*(3), 302–325. Scopus. https://doi.org/10.1057/mel.2009.7

Abrahamoglu, S., Haug, K., Basso, M. N., & Jakobsen, E. (2023). *Maritim verdiskapingsrapport 2023*.

Adland, R., Cariou, P., & Wolff, F.-C. (2017). What makes a freight market index? An empirical analysis of vessel fixtures in the offshore market. *Transportation Research Part E: Logistics and Transportation Review*, *104*, 150–164. https://doi.org/10.1016/j.tre.2017.06.006

Adland, R., & Sværen, O. (2017). The determinants of asset mothballing in the offshore supply market. *2017 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM)*, 1460–1463. https://doi.org/10.1109/IEEM.2017.8290135

Alqahtani, A. Y., & Rajkhan, A. A. (2020). E-learning critical success factors during the covid-19 pandemic: A comprehensive analysis of e-learning managerial perspectives. *Education Sciences*, *10*(9), 1–16. Scopus. https://doi.org/10.3390/educsci10090216

Anish. (2021, April 6). *What ISM Certificates You Require to Start a Shipping Company?* https://www.marineinsight.com/marine-safety/what-ism-certificates-you-require-to-start-a-shipping-company/

Attia, A. M., Ghaithan, A. M., & Duffuaa, S. O. (2019). A multi-objective optimization model for tactical planning of upstream oil & gas supply chains. *Computers and Chemical Engineering*, *128*, 216–227. Scopus. https://doi.org/10.1016/j.compchemeng.2019.06.016

Ben Farah, M. A., Ukwandu, E., Hindy, H., Brosset, D., Bures, M., Andonovic, I., & Bellekens, X. (2022). Cyber Security in the Maritime Industry: A Systematic Survey of Recent Advances and Future Trends. *Information (Switzerland)*, *13*(1). Scopus. https://doi.org/10.3390/info13010022

Brønn, P. S. (2019). *Åpen eller innadvendt omdømmebygging for organisasjoner*. Gyldendal.

Bullen, C. V., & Rockart, J. F. (1981). A primer on critical success factors. *Center for Information Systems Research, Sloan School of Management*.

Chagas, R. D. S., Soares, J. B. C. O., Longhi, R. P., Vieira, B. F., de Arruda, E. F., Leite, L. S. B. S., & Filho, V. J. M. F. (2023). A solution framework for the integrated periodic supply vessel planning and port scheduling in oil and gas supply logistics. *Optimization and Engineering*, *24*(3), 1537–1575. Scopus. https://doi.org/10.1007/s11081-022-09742-3

Cruz, R., Mendes, A. B., & Bahiense, L. (2023). Schedule robustness in the periodic supply vessels planning problem with stochastic demand and travel time. *International Transactions in Operational Research*. Scopus. https://doi.org/10.1111/itor.13241

D'Agostino, R. B., & Belanger, A. (1990). A Suggestion for Using Powerful and Informative Tests of Normality. *The American Statistician*, *44*(4), 316–321. JSTOR. https://doi.org/10.2307/2684359

EcoOnline. (n.d.). *HSEQ Meaning & Definition | EcoOnline*. Health, Safety, Quality, and Environment (HSEQ). Retrieved May 14, 2024, from https://www.ecoonline.com/glossary/hseq

Eidesvik Offshore ASA. (2023). *Report for Q4 2023*.

energidepartementet, O. (2021, October 12). *Norsk oljehistorie på 5 minutter* [Redaksjonellartikkel]. Regjeringen.no; regjeringen.no. https://www.regjeringen.no/no/tema/energi/olje-og-gass/norsk-oljehistorie-pa-5-minutter/id440538/

Fassin, Y. (2009). The stakeholder model refined. *Journal of Business Ethics*, *84*(1), 113–135. Scopus. https://doi.org/10.1007/s10551-008-9677-4

Gaspar, H. M., Hagen, A., & Erikstad, S. O. (2016). On designing a ship for complex value robustness. *Ship Technology Research*, *63*(1), 14–25. Scopus. https://doi.org/10.1080/09377255.2015.1119923

Hastig, G. M., & Sodhi, M. S. (2020). Blockchain for Supply Chain Traceability: Business Requirements and Critical Success Factors. *Production and Operations Management*, *29*(4), 935–954. Scopus. https://doi.org/10.1111/poms.13147

Innovasjon Norge. (2023, August 29). *Bærekraft og ansvarlig næringsliv*. https://www.innovasjonnorge.no/artikkel/baerekraft-og-ansvarlig-naeringsliv

International Maritime Organization. (n.d.). *International Maritime Organization*. Retrieved May 14, 2024, from https://www.imo.org/

Jacobsen, D. I. (2018). *Hvordan gjennomføre undersøkelser?: Innføring i samfunnsvitenskapelig metode* (3. utg). Cappelen Damm akademisk.

Kess, P., Law, K. M. Y., Kanchana, R., & Phusavat, K. (2010). Critical factors for an effective business value chain. *Industrial Management + Data Systems*, *110*(1), 63–77. https://doi.org/10.1108/02635571011008407

LLC, C. L. (n.d.). *5 Ways to Get More from the Shipping RFP Process | Capstone Logistics, LLC*. 5 Ways to Get More from the Shipping RFP Process. Retrieved April 7, 2024, from https://www.capstonelogistics.com/blog/5-ways-to-get-more-from-the-shipping-rfp-process/

Luthra, S., Garg, D., & Haleem, A. (2016). The impacts of critical success factors for implementing green supply chain management towards sustainability: An empirical investigation of Indian automobile industry. *Journal of Cleaner Production*, *121*, 142–158. Scopus. https://doi.org/10.1016/j.jclepro.2016.01.095

Maritim Logg. (2023). Tror det bygges nye offshoreskip om ett til to år. *Maritim Logg*, *9*, 29.

Marshall, G., & Jonker, L. (2010). An introduction to descriptive statistics: A review and practical guide. *Radiography*, *16*(4), e1–e7. https://doi.org/10.1016/j.radi.2010.01.001

McDuffie, E., Smith, S., O'Rourke, P., Tibrewal, K., Venkataraman, C., Marais, E., Zheng, B., Crippa, M., Brauer, M., & Martin, R. (2020). A global anthropogenic emission inventory of atmospheric pollutants from sector- and fuel-specific sources (1970-2017): An application of the Community Emissions Data System (CEDS). *EARTH SYSTEM SCIENCE DATA*, *12*(4), 3413–3442. https://doi.org/10.5194/essd-12-3413-2020

Men, F., Yaqub, R., Yan, R., Irfan, M., & Haider, A. (2023). The impact of top management support, perceived justice, supplier management, and sustainable supply chain management on moderating the role of supply chain agility. *FRONTIERS IN ENVIRONMENTAL SCIENCE*, *10*. https://doi.org/10.3389/fenvs.2022.1006029

Mi News Network. (2022, March 6). *What is Ship Management?* https://www.marineinsight.com/maritime-law/what-is-ship-management/

Norskpetroleum. (n.d.-a). *Licensing position and recent rounds*. Norskpetroleum. Retrieved January 13, 2024, from https://www.norskpetroleum.no/en/exploration/licensing-position-for-the-norwegian-continental-shelf/

Norskpetroleum. (n.d.-b). *Produksjonsprognoser*. Norskpetroleum.no. Retrieved February 7, 2024, from https://www.norskpetroleum.no/produksjon-og-eksport/produksjonsprognoser/

Norskpetroleum. (n.d.-c). *The service and supply industry*. Norwegianpetroleum.No. Retrieved April 30, 2024, from https://www.norskpetroleum.no/en/developments-and-operations/service-and-supply-industry/

Norwegian Maritime Authority. (n.d.). *Regelverk—Sjøfartsdirektoratet*. Retrieved February 23, 2024, from https://www.sdir.no/sjofart/regelverk/#laws

Norwegian Shipowners Association. (2024). *Maritime Outlook 2024*. https://www.rederi.no/globalassets/dokumenter/alle/rapporter/maritime-outlook-2024.pdf

Papaspyros, L. (2023, August 11). Shipowners and Charterers: What's the difference? *MarineTraffic Blog*. https://www.marinetraffic.com/blog/shipowner-charterer-difference/

Patrucco, A., Harland, C., Luzzini, D., & Frattini, F. (2022). Managing triadic supplier relationships in collaborative innovation projects: A relational view perspective. *Supply Chain Management- an International Journal*, *27*(7), 108–127. https://doi.org/10.1108/SCM-05-2021-0220

Porter, M. E. (1991). Towards a Dynamic Theory of Strategy. *Strategic Management Journal*, *12*, 95–117. JSTOR.

Queiroz, M. M., & Mendes, A. B. (2020). Critical Success Factors of the Brazilian Offshore Support Vessel Industry: A Flexible Systems Approach. *Global Journal of Flexible Systems Management*, *21*, 33–48. Scopus. https://doi.org/10.1007/s40171-020-00239-5

Raut, R. D., Narkhede, B., & Gardas, B. B. (2017). To identify the critical success factors of sustainable supply chain management practices in the context of oil and gas industries: ISM approach. *Renewable and Sustainable Energy Reviews*, *68*, 33–47. Scopus. https://doi.org/10.1016/j.rser.2016.09.067

Rockart, J. (1979). Chief executives define their own data needs. *Harvard Business Review*, *57*(2), 81—93.

Roos, G., von Krogh, G., Roos, J., & Boldt-Christmas, L. (2014). *Strategi: En innføring* (6th ed.). Fagbokforl.

Santos, A. M. P., Fagerholt, K., Laporte, G., & Guedes Soares, C. (2022). A stochastic optimization approach for the supply vessel planning problem under uncertain demand. *Transportation Research Part B: Methodological*, *162*, 209–228. Scopus. https://doi.org/10.1016/j.trb.2022.05.015

Skoko, I., Lušić, Z., Sanchez-Varela, Z., & Boko, Z. (2024). Optimization Model for Selection of the Offshore Fleet Structure. *Journal of Marine Science and Engineering*, *12*(2). Scopus. https://doi.org/10.3390/jmse12020263

Snyder, J. (2022, May 11). *North Sea platform supply vessel market "on fire."* Riviera. https://www.rivieramm.com/news-content-hub/news-content-hub/north-sea-platform-supply-vessel-market-on-fire-71080

The Norwegian Tax Administration. (n.d.). *Shipping companies*. The Norwegian Tax Administration. Retrieved May 14, 2024, from https://www.skatteetaten.no/en/business-and-organisation/reporting-and-industries/industries-special-regulations/shipping/

Tidewater. (2023). *Sustainability Report 2022*. https://www.tdw.com/wp-content/uploads/2023/03/Tidewater_Sustainability_2022_Final-2023.03.03.pdf

Tran, T. M. T., Yuen, K. F., Li, K. X., Balci, G., & Ma, F. (2020). A theory-driven identification and ranking of the critical success factors of sustainable shipping management. *Journal of Cleaner Production*, *243*, 118401. https://doi.org/10.1016/j.jclepro.2019.118401

Tseng, M.-L., & Chiu, A. S. F. (2013). Evaluating firm's green supply chain management in linguistic preferences. *Special Volume: Sustainable Consumption and Production for Asia: Sustainability through Green Design and Practice*, *40*, 22–31. https://doi.org/10.1016/j.jclepro.2010.08.007

Universitetet i Oslo. (n.d.). *Nettskjema*. Nettskjema. Retrieved May 15, 2024, from https://nettskjema.no

Vieira, B. S., Ribeiro, G. M., Bahiense, L., Cruz, R., Mendes, A. B., & Laporte, G. (2021). Exact and heuristic algorithms for the fleet composition and periodic routing problem of offshore supply vessels with berth allocation decisions. *European Journal of Operational Research*, *295*(3), 908–923. Scopus. https://doi.org/10.1016/j.ejor.2021.03.022

8 Appendices

8.1 A1 Survey questionnaire

Critical success factors of the Norwegian Offshore Support industry

Purpose of the project

You are invited to participate in a master thesis project where the main purpose is to understand the critical success factors of the Norwegian offshore support industry.
The research question is: What is the most important critical success factors in the Norwegian offshore support industry? To figure this out we have conducted a systematic literature review and have identified 27 critical success factors which can be categorized into 11 categories: strategic management, supplier management, regulatory, financial, reputation, bidding process, innovation, environment, workforce, competitiveness, and operations. The data collected from this survey will have the purpose to rank the critical success factors according to degree of influence. The survey takes approximately 10 minutes to complete.

Which institution is responsible for the research project?

University of South-Eastern Norway.

Why are you asked to participate?

The survey has been sent out to people in relevant roles of shipping companies that operates in the OSV industry in Norway. To develop a better understanding of the critical success factors of the industry, we need expert knowledge. Hence, as an expert, a range of directors, managers and consultants are being asked to participate in the survey.

What does participation involve for you?

If you choose to take part in the project, this will involve that you fill in the online survey. This will take approx. 10 minutes. Your answers will be recorded electronically.

Storage of data

The student and supervisor in connection with USN will only use the collected data for the purpose specified above. The survey is completely anonymized, and you will not be recognized for doing the survey. The data will be stored in *Nettskjema* which is an anonymous online survey provider. The planned end date of the project is 1. July. At the end of the project all the collected data will be deleted.

If you have questions about the project, please contact: Ingrid Alpen, by email: ingridalpen@gmail.com.

Definitions

Critical success factors are elements that contributes to the achievement of organizational goals and objectives. Beneficial outcomes in these key areas of activity are essential for the business to reach its goals.
In this survey we limit offshore support vessels to only include platform supply vessels **(PSV)** and anchor handling tug supply vessels **(AHTS)**.

In this research we are only interested in data related to vessels operating on the **Norwegian Continental Shelf**. Therefore, we want you to answer the questions according to what applies only for the vessels that currently operate on the Norwegian Continental Shelf, not vessels operating in other countries.

Your company's number of employees (choose one)

<50

50-99

100-499

500-999

>1000

What is your role in the company?

Director

Operations manager

General manager

Commercial manager

Financial manager

Consultant

Other

If other, please specify under:

To what extent do the following factors affect the companý s ability to succeed in the offshore support industry? (choose one option)

0= No opinion, 1= No influence at all, 5= High influence. Please note that we are only interested in answers related to the management of vessels operating in Norway.

Strategies to avoid lay-up in times of low demand

0; no opinion

1; no influence at all

2

3

4

5; high influence

Sustainability strategies

0; no opinion

1; no influence at all

2

3

4

5; high influence

Business ethics

0; no opinion

1; no influence at all

2

3

4

5; high influence

Transparency of business

0; no opinion

1; no influence at all

2

3

4

5; high influence

Board composition

0; no opinion

1; no influence at all

2

3

4

5; high influence

Current legislation

0; no opinion

1; no influence at all

2

3

4

5; high influence

Political information to support planning (contract opportunities)

0; no opinion

1; no influence at all

2

3

4

5; high influence

Taxation policies implemented by the government

0; no opinion

1; no influence at all

2

3

4

5; high influence

Availability of high-quality suppliers

0; no opinion

1; no influence at all

2

3

4

5; high influence

Maintenance of supplier relationships

0; no opinion

1; no influence at all

2

3

4

5; high influence

Bidding bureaucracy and its impact on productivity

0; no opinion

1; no influence at all

2

3

4

5; high influence

The utilization of data systems to optimize the planning operations

0; no opinion

1; no influence at all

2

3

4

5; high influence

Tools and techniques to identify improvements

0; no opinion

1; no influence at all

2

3

4

5; high influence

Health and safety of employees

0; no opinion

1; no influence at all

2

3

4

5; high influence

Qualified personnel

0; no opinion

1; no influence at all

2

3

4

5; high influence

Cooperation with universities

0; no opinion

1; no influence at all

2

3

4

5; high influence

Knowledge of competitors (strength and weaknesses)

0; no opinion

1; no influence at all

2

3

4

5; high influence

Cost efficiency

0; no opinion

1; no influence at all

2

3

4

5; high influence

Quality of operations

0; no opinion

1; no influence at all

2

3

4

5; high influence

Risk reduction in operations

0; no opinion

1; no influence at all

2

3

4

5; high influence

The use of key performance indicators to assess operations

0; no opinion

1; no influence at all

2

3

4

5; high influence

Difficulty in obtaining financing

0; no opinion

1; no influence at all

2

3

4

5; high influence

Emission reduction

0; no opinion

1; no influence at all

2

3

4

5; high influence

ESG reporting

0; no opinion

1; no influence at all

2

3

4

5; high influence

Specialists in environmental issues

0; no opinion

1; no influence at all

2

3

4

5; high influence

Environmental licensing costs

0; no opinion

1; no influence at all

2

3

4

5; high influence

Environmental certification ISO 14001

0; no opinion

1; no influence at all

2

3

4

5; high influence

If you would like to provide any other feedback or suggestions, please write below: