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Abstract

Aquaculture has become the largest seafood sector in Norway, with suppliers of technology and services among the world's most innovative and technologically leading companies within this industry. Some of these suppliers act as intermediates between buyers and sub-suppliers and deliver products and services to other companies. The concept of back-to-back contracts is used in these situations, where the goal is to coordinate the contract terms from the main sales contract further down the contract chain.

There is a trend towards outsourcing non-core business activities in the private sector, making procurement more common. A challenge in writing contracts for the business relationship between the parties is making them complete, as procurement contracts can be complex. It is important to make clear what risk and responsibility each party has.

This thesis will investigate sales contracts that are a part of a back-to-back relation within a private company in the aquaculture industry. The problem statement is *identifying risk allocation and ambiguities in sales contracts in an aquaculture company*.

To help answer this problem statement, a specific company in the aquaculture industry is studied as a case study for this thesis. This company provides technology and services for this industry. Sales contracts between the company and its customers are compared to industry standardized general conditions and analyzed for risk allocation and potential grey areas that can lead to ambiguities. Interviews with company employees are also completed to cover this more properly, in addition to questions about related processes around contract establishment and project execution and ending.

The study shows that the risk allocation seems to be well distributed between the relevant parties regarding the risk being with the party that has control over the matter. There should be more standard processes and greater compliance between documents in the back-to-back contract chain to decrease ambiguities. Another way to reduce the ambiguity is through good customer communication, which it seems like the company for this case study has.

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This thesis was written in the spring of 2021 and is the finishing work of the master's program Industrial Economics at the University of Stavanger. It has been an exciting and educational study.

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Marie Bjørheim

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Abbreviations and acronyms

The abbreviations and acronyms used in this thesis are listed below.

CAT	Customer acceptance test
CRC	Cost reimbursement contract
EXW	Ex works
FAT	Factory acceptance test
FCA	Free carrier
FPC	Fixed price contract
GA	General arrangement
IC	Incentive contract
Incoterms® 2020	International Commercial Terms (newest version 2020)
ISO	International Organization of Standardization
NL 17	General conditions for delivery of machinery as well as other mechanical electrical and electronic equipment in and between Denmark, Finland, Norway and Sweden (newest version 2017)
NLM 19	General conditions for delivery and installation of machinery as well as other mechanical electrical and electronic equipment in and between Denmark, Finland, Norway and Sweden (newest version 2017)
NS 9415:2009	Marine fish farms - Requirements for site survey, risk analyses, design, dimensioning, production, installation and operation (newest version 2009)
Orgalim S 2012	General Conditions for the supply of mechanical, electrical and electronic products (newest version 2021)
Orgalim SI 14	General Conditions for the supply and installation of mechanical, electrical and electronic products (newest version 2014)
RFP	Request for proposal

SW 14	General Conditions for Computer Software, supplement to Orgalim S 2012 and Orgalim SI 14 (newest version 2014)
VO	Variation order

Terminology

Some of the terminology used in this thesis will be accounted for below.

Agent	The party selling the product or service. Can also be referred to as the contractor or supplier.
Back-to-back contracts	Coordination of the contractual conditions from the main contract (sales contract) to the subcontract (procurement contract).
Company	When company is written with a capital C it is referred to the company that is the background for the case study in this thesis. When written with a lower c it means any company.
Customer	The company buying Product from Company .
Ex-ante	Refers to “before something.” This is used in the context with the time before the finished production of Product as it is in the shipyard.
Ex-post	Refers to “after something.” This is used in the context with the finished production of Product as it is in the shipyard.
Force majeure	Circumstance beyond the control of the contractual parties.
General conditions	General conditions is a set of conditions for the supply (and installation) of mechanical, electrical and electronic products.
Installation	Installation of all the machinery, apparatus, materials, articles, documentation, software and other products that are a part of Product . An older version of Orgalim uses the word erection for the installation.
Principal	The party buying the product or service. Can also be referred to as the customer or client.
Procurement contract	The contract between Company and the shipyard .
Product	In this thesis, Product, written with a capital P, is the product in the analyzed sales contracts . The general conditions use the term <i>works</i> when the installation is included. This thesis does not distinguish from this because product is a more general and understandable expression and the analysis only

includes the conditions with the installation and does not need to distinguish between product/works in that sense.

Sales contract	The contract between the customer and Company . In the thesis it is mostly used just “contract.” It is sometimes also referred to the a contract between Company and a subcontractor , the shipyard . This will then be specified as the procurement contract .
Shipment	The delivery of Product from the shipyard to the customers location.
Shipyard	The place of manufacturing Product .
Stakeholder	Those who influence or are influenced by Product .
Subcontractor	Refers to contractors to Company or shipyard (where the shipyard is a subcontractor of Company). Used interchangeably with sub-supplier.
Tender	The document with the offered proposal to the customer , before the document is signed.

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1 Introduction

The aquaculture industry started as an industry for a few enthusiasts but has since grown to become the largest Norwegian seafood sector. Today, many large players support the industry technologically and financially. Norwegian aquaculture suppliers of technology and services are among the world's most innovative and technologically leading companies within the seafood sector (Norwegian Seafood Federation, 2017).

Some suppliers specialize in delivering products or services to other companies and work as intermediates between buyers and sub-supplier(s). The concept of back-to-back contracts is used in these situations. Back-to-back contracts coordinate the contract terms from the main contract, the sales contract, to the entire contract chain.

Contracts define all business relationships but will rarely be fully complete in describing all possible relevant terms of the business relationship. A procurement contract may seem straightforward but is complex with no obvious right or wrong. There are many aspects to consider, and the procurement procedure must be customized to each situation. There is a trend towards outsourcing non-core business activities in the private sector, and procurement is becoming more common (Dimitri, Piga, et al., 2006). With more parties involved, it is important that the responsibility and risk of each party to the contract are correctly allocated and is clear for all involved parties. In this respect, it is interesting to look at the sales contracts that are a part of a back-to-back relation within a private company in the aquaculture industry.

1.1 Problem statement

This thesis intends to take a closer look at some of the challenges related to the sales contract for a company that is the intermediate in a back-to-back contract relation. This thesis aims to answer the following problem statement:

Identifying risk allocation and ambiguities in sales contracts in an aquaculture company.

How the thesis will investigate this problem statement is described in the next section.

1.2 Scope of the thesis

This thesis will investigate a specific company's contracts and procedures using the methods document analysis (of the contracts) and interviews. A lot could be covered within this large topic, but the thesis will be restricted to the sales contracts between Company and its customers. There are four sales contracts for a Product that will be analyzed. The analysis of the contracts will compare the contracts

to industry standardized general conditions, look at risk allocation between the parties, and ambiguities that might lead to potential disagreements or conflicts between the parties, so-called “grey areas.”

As Company is an intermediate between the customer and a shipyard, it would be interesting to go into depth on the contracts between Company and the shipyard. Still, any contracts with subcontractors will not be analyzed. However, through interviews with key employees of Company involved with these procurement contracts, questions will be asked about these to get an overview related to the sales contracts.

The risk allocation and ambiguities of the sales contracts will be a part of the interview questions. In addition, the interviews will ask questions regarding processes concerning the sales contracts to get an overall picture and identify any source of ambiguity before contract signing. The interviews will also address questions about processes after contract signing regarding project execution and end.

The literature on contract theory and risk theory is comprehensive. Naturally, this thesis will not cover all but some essential areas necessary to answer the problem statement of the thesis.

The author of this thesis does not have any legal background. It is by no means intended to analyze the legal part of the contracts but rather to identify where there could arise legal difficulties.

1.3 Structure of the thesis

- 1 Introduction** The introduction chapter is the current chapter that introduces the problem statement and what areas this thesis will go into to answer this. The chapter then accounts for the structure of the thesis.
- 2 Background** The background chapter aims to give a short presentation of the company that is the case study for the thesis and the company’s industry.
- 3 Theory** The theory chapter will present some central theories from contract theory and risk theory.
- 4 Method** The method chapter will explain the choice and use of methods in this thesis. Then the quality of the study will be accounted for.
- 5 Results** The results chapter presents the analysis of the sales contracts and the findings from the interviews.

6 Discussion The discussion chapter will be based on the interviews and discuss up against the contract analysis. The discussion will point out topics related to the problem statement presented in chapter 1.

7 Conclusion The conclusion chapter will summarize the discussion chapter and answer the problem statement within the scope of this thesis. It will also present some suggestions for improvements.

8 References The references chapter lists all the references used in work with the thesis.

2 Background

The company on which the case study in this thesis is based is part of the aquaculture industry. The aquaculture industry is a major export industry in Norway, where the greater part is farmed salmon. Currently, Norway is the largest producing country of Atlantic salmon and the largest sea-based producer of marine fish in the world (Norwegian Seafood Federation, 2017). In 2019 the turnover was 68 billion Norwegian Kroners (NOK) in first-hand value of salmon (Statistics Norway, 2020). Norway has a long tradition with fisheries, and aquaculture is a more recent approach compared to this. The octagonal cages set out in Laksåvika on Hitra in Norway in 1970 are seen as the first fish cages in the world (Norwegian Seafood Federation, 2011).

Company is an international company that provides technology and services for the aquaculture industry. They have several decades of experience within this industry. Company has headquarters in Norway and offices worldwide. As Figure 2.1 shows, Company works as an intermediate between the customer and the subcontractors to deliver Product to the customer.

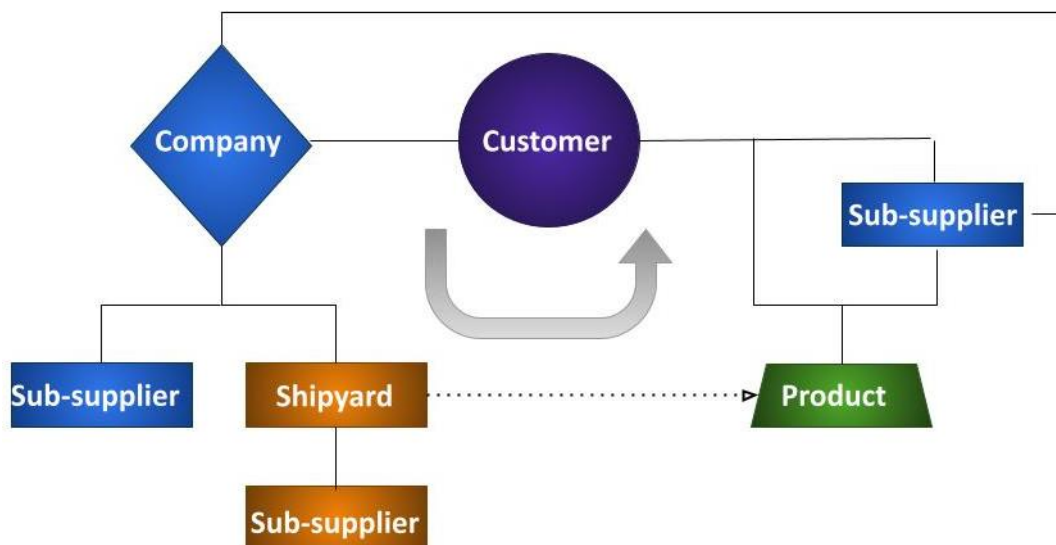


Figure 2.1 The process from contract negotiations to delivery of Product.

The process starts with negotiations between the customer and Company regarding Product specifications. Meanwhile, Company is in contact with the shipyard (one or multiple) and other sub-suppliers. The shipyard also has its sub-suppliers. When the customer signs the sales contract, Company can sign the procurement contract with the shipyard. From this point, the project starts. The project model used is the waterfall type. A factory acceptance test (FAT) will take place with the completion of Product at the shipyard. From here, Product will be moved from the shipyard to the customer's

location. The shipment is either done by the customer or Company. Company will use a sub-supplier for the shipment. A customer acceptance test (CAT) will then be carried out upon arrival at the customer's location, together with commissioning and necessary training in facilities and programs.

The contracts represent a mechanical product used in this industry that is built following NS 9415 (Standard Norge, 2009). The projects concerning this Product do not classify as new product development (NPD) projects, but Products can be custom-made to the customers.

Figure 2.2 shows an illustration of a part of the organization within Company.

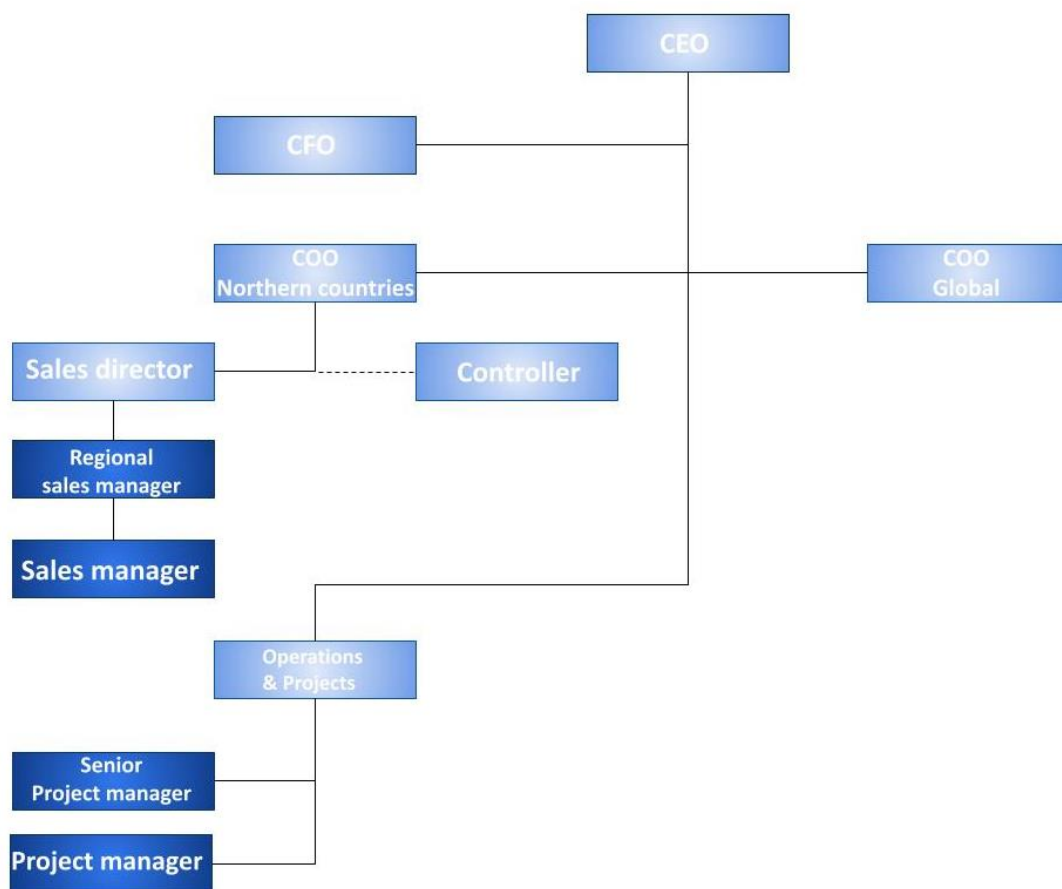


Figure 2.2 Company's organization¹.

The highlighted sales managers and project managers in Figure 2.2 are the interviewees for this thesis. It is referred to chapter 4.2.2 on methods for the interviews, and chapter 5 on interview findings.

Company and its customers will be held anonymous in this report.

¹ Abbreviations: Chief executive officer (CEO), Chief financial officer (CFO), and Chief operational officer (COO).

3 Theory

This chapter is divided into two main parts. The first part about contract theory will go through procurement, compensation formats, incomplete contracts, and industry related standard contracts. The second part about risk theory will first give an introduction to risk theory and then shortly present risk management.

3.1 Contract theory

Contract theory studies how to optimize the design of incentive schemes in contracts that get the involved parties to behave efficiently (Schmidt, 2017). Contract theory focuses mostly on situations where only two, or just a few, parties interact.

A contract is an obligation where the parties have agreed to do, or abstain from, some act (Gardiner, 2005). For the contract to be legally binding, the contract must show that both parties have accepted the offer with the including terms and conditions, a price is set, the offer is legal, and the parties are legally capable of contracting. It must be clear in the contract as to who has what responsibility.

In situations where there are several stages to the contract relationship, a concept called back-to-back is often used. The back-to-back concept involves contract conditions and terms used in the main contract shall act as a base in subcontracts. The back-to-back concept is not a legal principle and should only be referred to as a concept (Tørum & Frøholm, 2005). The purpose is to coordinate the contract chain where relevant, and it can be distinguished between formal and real back-to-back. In formal back-to-back, the structure is more or less the same, only modified. With a real back-to-back, there is a greater degree of release from the structure in the main contract. A variant to the real back-to-back is using a standard contract and aligning it with the main contract where relevant (Tørum & Frøholm, 2005).

Many of these economic arrangements, the contracts, can be described as a principal and agent relationship (Shavell, 1979). This is the case where only one of the two parties, the agent, does the work (or can directly influence the outcome), and the other party, the principal, enjoys the outcome of the effort done by the agent. The theory of the principal-agent problem includes optimal risk sharing and incentives between the two parties. An example of a principal and agent relationship is between a buyer of a product or service and the supplier of this (that is, the situation for the case study in this thesis). The contract between the parties must set obligations and promises to protect the parties against risk for unexpected changes in future behavior in this procurement transaction (Albano et al., 2006). See next section for procurement.

3.1.1 Procurement

Procurement is the process of obtaining hardware, software, or services from outside sources (Wysocki, 2019). The planning in procurement is deciding what deliverables in the project to buy and when to buy (Gardiner, 2005). The sales contracts investigated in this thesis will be Company’s customers’ procurement contracts, while the contracts with the shipyard will be Company’s procurement contracts.

It can be distinguished from public and private procurements. The public procurements are required to follow Law and Regulations for public procurements. Private procurements have many of the same and similar procedures but are not required to follow the same set of rules and are therefore not as strict. Following this, the relationship between the private actors becomes more important. The company investigated in this thesis is a part of the private sector.

The procedures in procurement are all the activities done in the procurement of the products or services, and are called the procurement process.

3.1.1.1 Procurement process

The procurement process in Figure 3.1 shows the process divided into three main parts, with related processes around.

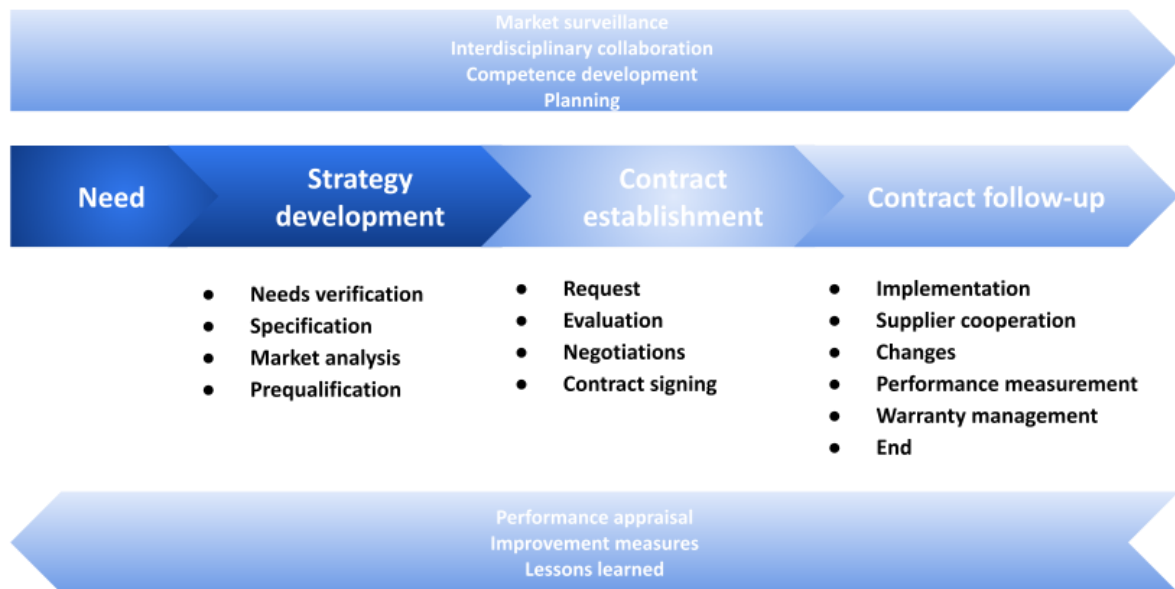


Figure 3.1 An overview of the procurement process (Bruvoll, 2020b).

The three main parts are strategy development, contract establishment, and contract follow-up (Bruvoll, 2020b). Gardiner (2005) divides the procurement into four phases; requirements planning, solicitation, awarding, and contract management, while Wysocki (2019) divides the procurement management into

five processes; vendor solicitation, vendor evaluation, vendor selection, vendor contracting, and vendor management. The content is essentially the same, but the grouping is somewhat different.

In relation to Figure 3.1 these phases and processes are mainly what the figure refers to as contract establishment (except requirements planning that is a part of strategy development, and contract administration and vendor management that is a part of the contract follow-up). The contract establishment is the most relevant phase for this thesis, which includes the period from when the request is sent, or received, up until the signed contract. Contract follow-up is also important regarding supplier cooperation and changes.

Strategy development

Requirements planning is about setting the content and boundary of the procurement (Gardiner, 2005). This content and boundary should be carefully described in a project charter at the start of the project. The decision on whether to make or buy project deliverables is set here. Reasons for buying goods or services are the best choice if own expertise is not sufficient, not available capacity, and a faster process if there are already good solutions on the market (Gardiner, 2005). Examples of what a customer might procure are computing, systems engineering or electrical engineering services, equipment and projects supplies, and construction and manufacturing services (Gardiner, 2005).

A commonly used tool for market analysis is Porter's five forces consisting of (1) rivalry among existing competitors, (2) threat of new entrants, (3) bargaining powers of buyers, (4) threat of substitute products or services, and (5) bargaining power of suppliers (Porter, 2008). Another tool to judge the market situation is Kraljic's matrix with the importance of purchasing and complexity of supply market on the two axes (Kraljic, 1983).

Contract establishment

The process of identifying a supplier to deliver the goods or services needed is called solicitation (Gardiner, 2005). This process is dependent on the client knowing what it wants to be done, how it should be done, and the value of the item. The solicitation can be done with competition, via public advertising (most used in the public sector) or supplier lists, or without competition with sole-source solicitation. Types of bids used in this process are presented in Table 3.1.

Table 3.1 Types of bid solicitations (Gardiner, 2005).

Bid solicitations	Description
Telephone buy (T-buy)	Bids over the phone. Used for smaller and easily described purchases that are needed quickly.

Request for quotation (RFQ)	A simple one-page document requesting a description of the goods or services and a list of terms and conditions. Suppliers respond with a quotation document with information about price and delivery. Considered an informal method for tendering.
Invitation to tender (ITT)	The description of specifications of what is expected is in significant detail. Used for purchases with higher value and clear requirements. A formal method for tendering.
Request for proposal (RFP)	A formal method open for negotiations about matters like pricing and technical requirements. RFP's can contain a detailed description of how the work is performed or be simple and open to the suppliers' suggestions. However, there are criteria set in the RFP to evaluate the proposals.

Tenders and proposals are not the same. The acceptance of a tender results in a contract, while the RFP does not (it contemplates an offer) (Gardiner, 2005). The tender should be used when what is to be done is clear, and the RFP when this is less clear.

Wysocki (2019) emphasizes the importance of being specific in the RFP for higher chances of efficient and quick responses. In some cases, the client might be unsure of what the market has to offer or unable to identify correct suppliers and can, in that case, send out a request for information (RFI). The request for information is a broad net used to identify suppliers that might have the correct goods or services for the clients' needs (Wysocki, 2019). The request for information is a letter and seems to match what Gardiner (2005) describes as a letter of interest regarding it being a letter issued before the RFP. However, the way it is used is different. The letter of interest is used when there are many potential suppliers with the purpose of finding out which supplier is interested by submitting a letter.

There should be a time constraint on both the time for responding to the RFP and the time for the reviewal of the responses (Wysocki, 2019). The time constraints will facilitate a faster process and clearer expectations for both the vendor and the organization. Wysocki (2019, p. 132) recommends that the RFP should include *“introduction, business profile, problem or opportunity, Project Overview Statement (POS), Requirement Breakdown Structure (RBS), vendor responsibility, contract administration, instructions to vendors, vendor point of contract, time and cost estimates, pricing, and evaluation criteria.”*

The evaluation of proposals is normally done according to the criteria set in the RFP (Gardiner, 2005). It is important to have clear criteria before reading the responses to the proposal and involving an outside evaluation team that systematically reviews the responses (Wysocki, 2019).

The contract award can be made with or without negotiations. With negotiations, the supplier sends in proposal revisions that are held confidential (Gardiner, 2005). More than one evaluation phase is not

unusual either (Wysocki, 2019). The relation between customer and supplier is critical in this process for a smooth and short negotiation process.

Awarding is when the supplier is selected after evaluation, and the contract is signed. The payment and contract type are normally negotiated with the supplier. The intention is to set conditions that are fair considering risk and incentives (Gardiner, 2005).

If the development is to be done by the supplier only, the project manager's primary job is contract management. The project manager should get deliverable dates and a work breakdown structure (WBS) from the vendor. This way, the project manager can know if the project is on time and how the project's scope is broken down regarding the work. There should also be held regular status meetings, not rarer than once a week.

The outcome of the awarding might not only be a single award, but it could also be multiple awards or no award at all (Wysocki, 2019).

Contract follow-up

It is important to establish a working relationship and communication for the parties in the start-up. This establishment is best done through meetings and face-to-face discussions to ensure clear expectations and a mutual understanding (Wysocki, 2019). The people working on the project might not be the same people who sent the proposal. Gardiner (2005, p. 142) lists the main functions of contract administration:

- *“contract change management*
- *specification interpretation*
- *adherence to quality*
- *warranties*
- *subcontractor management*
- *monitoring the work*
- *contract breach and resolution of disputes*
- *project termination, payment schedules, and contract closeout.”*

Contract change management is one of the most important areas to think about (Wysocki, 2019). These changes are handled during the project execution as needs change and requirements are derived. The requested change must be reviewed and agreed upon by all involved parties and then tracked to keep a

history of the changes. Together with tracking the frequency of change requests over time, factors like the incidence of bugs, risks, issue resolution, staffing levels, and changes by position types should be tracked by both the project manager and supplier (Wysocki, 2019).

From the client's view, Wysocki (2019) points to a successful transition of product or product components from the supplier should be well planned with clear expectations of what is expected, and the transition includes acceptance testing. From the supplier's view, Wysocki (2019) makes it clear that the processes for client acceptance test procedures should be present in several phases of the project; during requirements gathering, project planning (documenting), project execution (maintaining), and project closing (criteria for entering this phase). A summary of the checklist should include (Wysocki, 2019):

- The expectation of the delivery and how it will be accepted
- The environment for accepting the delivery
- Whether the supplier should provide some support to the acceptance testing
- How any problems should be resolved
- Type of maintenance agreement
- How future changes should be resolved.

The handover process of the product, together with testing, can also include commissioning and start-up (Gardiner, 2005).

A most often overlooked part for the project manager is closing the contract (Gardiner, 2005; Wysocki, 2019). Things that should be considered regarding this are a clear line for when the project is finished and collecting all relevant files into one file and storing it. The clients' needs and expectations are fulfilled at the closure of the project (Gardiner, 2005). The closing phase should start as early as the planning phase, not just towards the end, and include closure activities during project execution. Starting this phase earlier will facilitate an efficient completion of the project.

Project closure gives a great opportunity for capturing organizational learning through lessons learned (Gardiner, 2005). New experience, skills, and knowledge might have been developed during a project, and this should be captured and distributed further to other projects. Project Management Institute (2017, p. 709) defines lessons learned as *"The knowledge gained during a project which shows how project events were addressed or should be addressed in the future for the purpose of improving future performance."* To address this, a document called the lessons learned register should be made to record the knowledge gained in the project. The lessons learned register might include a description of the

project, challenges, risks, opportunities, and recommendations. The lessons learned register is a document created at the beginning of the project and used and updated further throughout. To the end of the project, the lessons learned register is stored in a lessons learned repository with all historical information from projects (Project Management Institute, 2017).

Knowledge management is activities for knowledge sharing and knowledge integration in organizations. A usual misconception with knowledge management is that performing lessons learned to the end of the project is enough (Project Management Institute, 2017). Knowledge can be split into “explicit” knowledge that can easily be written down and expressed through pictures and numbers and “tacit” knowledge that is personal to the individual relating to beliefs and experience. With lessons learned, only the explicit knowledge will be captured. The tacit knowledge is more difficult to express and is usually shared through communication with people. Therefore, it should be facilitated for a trusting environment where people are motivated to share their knowledge and capture the knowledge of others (Project Management Institute, 2017).

3.1.1.2 *Managing expectations and communication*

It is important to make the supplier feel like an equal partner in the project (Wyssocki, 2019). If the supplier, or other stakeholders in the project, feel dissatisfied or are disappointed, the project can be less successful. However, the different stakeholders have different views and beliefs. The perceptions and expectations of the different stakeholders can be managed by making agreement and harmony in these different views (Gardiner, 2005). The tree swing example, illustrated in Figure 3.2, is a typical example of how different stakeholders see one project.

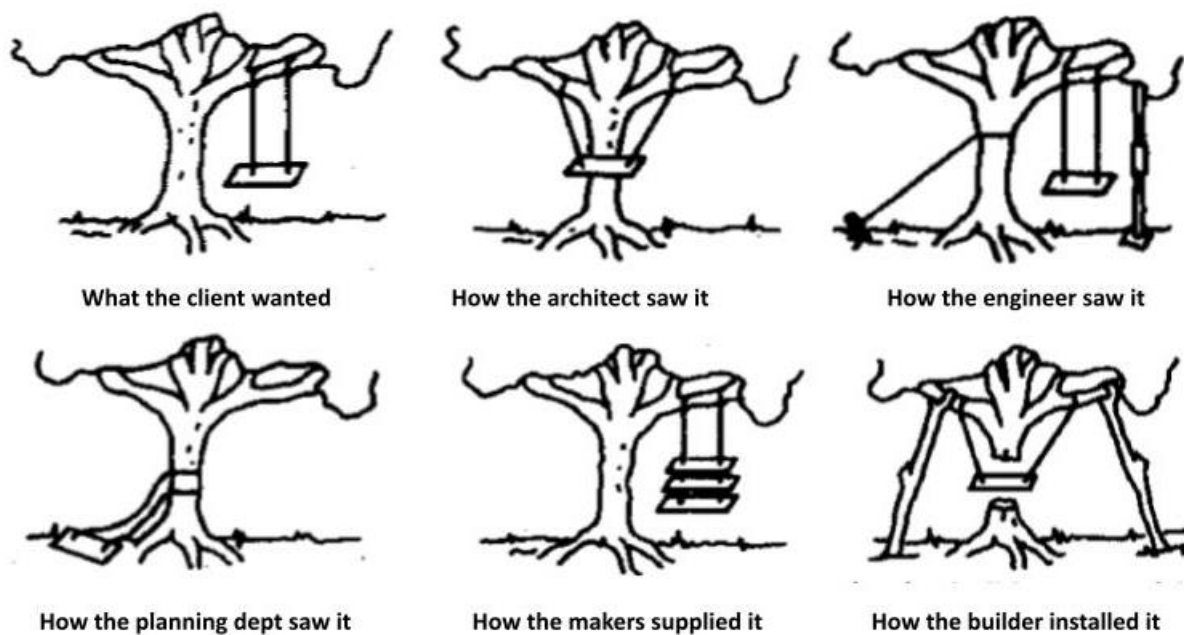


Figure 3.2 Different views of the same project (Gardiner, 2005).

The different views can benefit the early stages of the project for creativity. However, the view must be coincident as the project proceeds to not harm the project and waste time and effort in corrective measures. Wysocki (2019) points to the very beginning of the project to where the project runs into problems. The failure of, or lack of, communication starts at the beginning and proceeds to the end. There is often a gap in expectations from what the client wants and what the project manager is able to deliver (Wysocki, 2019). Both parties also might think they have a common understanding, while this is not the case. There should be demand verifications in all phases from the demand arise and further in phases regarding specifications, RFP, negotiations, contract, and administration (Bruvoll, 2020b).

The cause of many communications problems is often a difference in what the client says they want versus what they actually need. Wysocki (2019) has asked his clients why they want what they want to see the client’s problem, making it clearer what the need is. Bruvoll (2020b) also distinguishes between nice to have versus need to have.

Regarding the client, Gardiner (2005) distinguishes between two types; the knowledgeable client and the lay client. The knowledgeable client knows what he wants, how the product will work in the end, and can anticipate probable problems related to the operation. The lay client might think he knows what he wants, but in most cases, he does not. The lay client should seek professional help.

Two tools that might help clarify these expectations and needs are stakeholder analysis and conducting Conditions of Satisfaction (COS), presented in Figure 3.3.

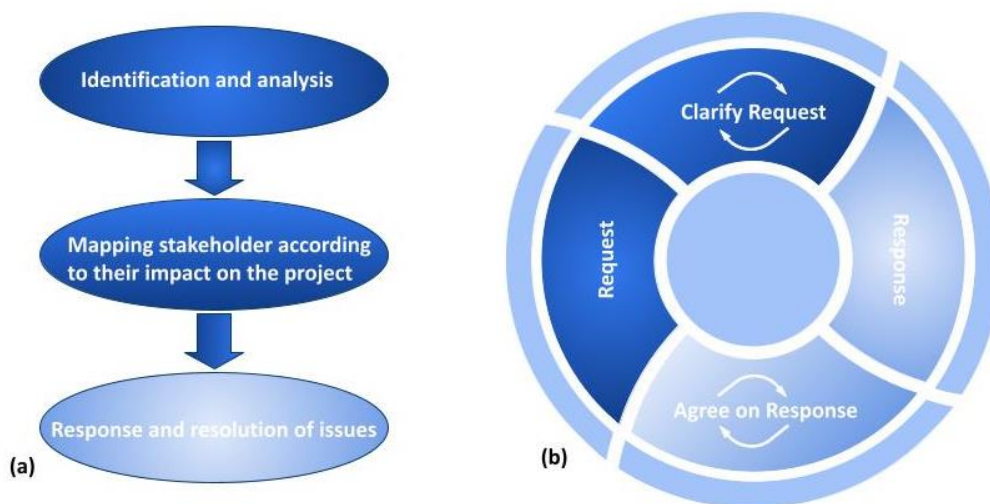


Figure 3.3 (a) Stakeholder analysis (Gardiner, 2005) and (b) Conditions of Satisfaction (Wysocki, 2019).

The stakeholder analysis is divided into three stages. The first stage includes brainstorming, and the second stage includes organizing the stakeholders into different matrices that consist of the dimensions

position/importance, power/predictability, and power/interest (Gardiner, 2005). The last stage is the response and resolution of the issues from the two former stages.

The Condition of Satisfaction is a structured conversation between the appointed project manager and the client where they go through the process shown in Figure 3.3. From this session, a one-page document is provided that clearly states what the project will get done. This document is called a Project Overview Statement (POS) and can include attachments (Wysocki, 2019).

3.1.1.3 Procurement risk

Events that cannot be accurately predicted and affected by contracting parties and might affect the performance of the contract are referred to as procurement risk (Albano et al., 2006). The procurement risk affects the project's costs and might affect the quality. Procurement risk applies to large and complex projects as well as smaller and less complex projects. Some examples of risks are the discovery of a resistant rock in a tunnel construction or late delivery of school milk (Albano et al., 2006).

How the buyer and contractor feel about the risk can be influential to the project. The fear of risk is called risk aversion (Albano et al., 2006; Aven, 2014). The opposite case would call the person or company risk seeking or risk lover. The following example will explain this further (Albano et al., 2006): A company is to choose between two investment decisions, A and B. Investment A will surely give the company 100 monetary units, while investment B has an equal probability for zero monetary units as 200 monetary units. The first choice is a riskless investment, and a company that prefers this option is said to fear risk, that is, be risk averse. Here the firm prefers the certain investment A over investment B that has an equal weighted average. If the company is indifferent between the certain investment and the investment with the equal expected monetary value, it is risk neutral.

In most cases, the contractor will not be able to become immune against all unpredicted events, for example, with insurance. However, the contractor's activities (breadth and nature of) might give useful proxies for the contractor's ability to "insure" himself (Albano et al., 2006). However, this ability to bear the procurement risk is of less importance when choosing a contract form. More important is the attitude toward risk for the contracting parties. For efficient risk sharing, the risk should be with the party that will manage it best. Say, if both parties are indifferent to risk, the optimal risk sharing is for the risk to be with the contractor to optimize the performance incentives and cost reducing activities.

Altogether, the allocation of procurement risk is considered one of the most important factors when the buyer chooses a procurement contract, together with the contract flexibility and the incentives for quality and cost reduction (Dimitri, Piga, et al., 2006). More on the different types of contracts in the next section, that is, compensation formats.

3.1.2 Compensation formats

There are different types of compensation formats to use in contracts. A compensation format is a structure in how the compensation of the transaction is to be done, that is, the payment between agent and principal.

There are three main categories of contracts used for procurement (Albano et al., 2006):

- Fixed price (lump sum) contracts
- Cost reimbursement (cost-plus) contracts
- Incentive contracts

Fixed price and incentive contracts are the most commonly used types of contracts. However, many contracts also use a mix of different categories in the same contract to better customize the situation. The following sections will give an introduction to the different categories.

3.1.2.1 Fixed price contracts

Fixed price contracts (FPC) are when the contractor receives a single price to complete the project with agreed quality requirements (Albano et al., 2006). This contract type is suitable for standardized products or services, as the requirements are well known and there is low uncertainty regarding changes.

There are usually penalties linked to the quality standard included in these contracts as the contractor has no incentive to deliver higher quality with no additional payment. These penalties have to be high enough to prevent the contractor from behaving opportunistically (Albano et al., 2006).

The contractor must deliver to the estimated costs presented with the bid and bears the risk of higher production costs and benefits from possible cost savings. Unexpected events must not be vital when calculating actual production costs, so the contractor controls the production costs (Albano et al., 2006).

There is a type of fixed price contract that helps reduce some risk of the contractor. This is the fixed price contract with economic price adjustments (FPCPA). This contract will allow for fluctuation of input prices the contractor uses, for example, labor and material (Albano et al., 2006).

If quality is verifiable, there can be incentives for cost reduction included in the fixed price contract. Albano et al. (2006) give an example of a situation where this is suitable: Some local public authorities are procuring a standard software package with a helpdesk. The costs are seen as predictable, and room for opportunism is only associated with the use of the helpdesk. In the design of the contract, it can be specified a minimum quality standard ex-ante that will give penalties if the quality falls below the

agreed quality standard ex-post. Such a quality standard can be a top time limit for answering queries at the helpdesk.

The contingencies in this contract can be observed by both parties (that is, contractor and user) and be verified by a third party (for example, with phone call records).

3.1.2.2 Cost reimbursement contracts

Cost reimbursement contracts (CRC) are when the buyer shall reimburse all documented operation costs for the contractor in relation to the project, plus a fee for supervision (Albano et al., 2006). This way, the contractor does not have to worry about potential cost overruns, and in the same way, has no incentive to make cost-reducing measures in the project. There is also potential for less effort and longer project duration. This type of contract also makes it difficult to choose the most efficient supplier in the tendering competition.

Two types of CRCs can help reduce this issue but do not fully solve it. These types are called the capped price contract (CPC) and unit price contract (UPC). The capped price contract sets a daily fee for a number of capped days (Albano et al., 2006). The daily fee includes a profit component. In the situation where the contractor finishes before the agreed days, the contractor's bill will be below the capped amount. If the situation is turned around, that the contractor needs a longer time, a case is needed for increasing the cap.

The unit price contract has no cap like the capped price contract, but the contractor lists the unit price for the different input factors, and the buyer agrees to pay for these input factors when awarding the contractor the project (Albano et al., 2006).

There can also be some acceptance criteria that will give penalties if not met (Wysocki, 2019).

CRCs are therefore not the best choice of a contract if costs are the main focus. If the quality is of great importance, this contract type can be suitable, as the contractor will be reimbursed the costs and therefore have no incentive to reduce the quality to save costs. This situation is good where the quality is non-verifiable, but the buyer should be aware of non-monetary values like time (Albano et al., 2006).

This contract type is also a good choice when the importance of flexibility is great. This is especially when the chance of renegotiation is big, that there are high chances that the design might change after contract signing, and the costs of renegotiations will therefore be lower (Albano et al., 2006).

3.1.2.3 Incentive contracts

Incentive contracts (IC) is the category that lies in between the two other categories, FPC and CRC. These contracts usually contain a target cost, a target profit, and a profit adjustment formula that will adjust the profit or fee upward or downward regarding the actual result (Albano et al., 2006).

Most ICs only include incentives related to costs. The intention is to motivate the contractor to manage their costs effectively. Normally, the cost incentive contracts take a linear form. At the extremes, the linear contract will take the form of FPC and CRC.

To focus more on the quality of a good or service that is to be delivered, analogous incentive contracts can be used. This type of contract specifies a base with bonuses related to different target levels.

The incentive contracts balance the risk and incentives between the parties, whether the focus is on costs or quality. The linear ICs include a cost sharing parameter (a value between 0 and 1) for the realized (verifiable) costs. A cost sharing parameter equal to 0 will result in a FPC, and a cost sharing parameter equal to 1 will result in a CRC. This parameter will help decide on the contractor's willingness to reduce costs. Three elements should be considered when setting the cost sharing parameter; (1) contractor's ability to carry procurement risk, (2) contractor's ability to predict shocks affecting production costs, and (3) contractor's investment and effort in cost-reducing activities. For example, if the contractor's risk aversion is high, there are highly unpredictable shocks, and the expected effort in cost-reducing activities is low, the cost sharing parameter should be set more near 1.

Two examples of incentive contracts are the unit rate and hour/day rate, where a price is set either by each measuring unit or by each hour or day, respectively (Bruvoll, 2020a). The next section will compare these two types of incentive contracts with fixed price contracts and cost reimbursement contracts for the allocation of risk, and criteria when selecting a compensation format.

3.1.2.4 Risk allocation and selection criteria

The three categories of contracts presented vary in how the risk is allocated between the client and contractor, as shown in Table 3.2. The risk allocation is shown by the terms quantity (Q), norm (N), and rate (R). It is clear how the FPC and CRC are the two contradicting categories.

Table 3.2 Compensation formats and the risk allocation between buyer and contractor (Bruvoll, 2020a).

Compensation category	Risk allocation	
	Buyer	Contractor
Fixed price		QxNxR
Incentive contracts (unit and hour/day rate)	Q	NxR
	QxN	R
Cost reimbursement	QxNxR	

The meaning of the compensation formats is not to remove risk, but rather to place the risk with the party that best can manage the risk, that is, not the party with the best capacity, but the party's relative attitude against risk (Albano et al., 2006; Bruvoll, 2020a). Therefore, this should be in mind when selecting a compensation format, together with the selection criteria presented in Table 3.3.

Table 3.3 Selection criteria for different compensation formats (Bruvoll, 2020a).

Selection criterion	Fixed price	Unit rate	Hourly/day rate	Cost reimbursement
Technical definition	High	Medium	Low	Low
Client's involvement	None	None	High	High
Market capability	High	High	Low	Low

The selection criteria from Table 3.3 are the level of technical definition, the client's involvement, and market capability, and is shown relative to fixed price contracts, two types of incentive contracts, and cost reimbursement contracts. Other factors to consider when selecting the compensation format are, among others, firmness and level of details to the project's scope, time, and capabilities of the project team (Gardiner, 2005).

3.1.3 Incomplete contracts

All contracts are, in a way, incomplete. The incompleteness is due to the fact that it is not possible to foresee every future event. Therefore the contract does not cover every possible event that might happen in the future. In a complete contract, there will be no unanticipated contingencies (Hart, 2017). However, incentive constraints coming from moral hazards or asymmetric information might be present. With asymmetric information during procurement and selection of compensation format, a problem called adverse selection can occur. Adverse selection is a problem at the contracting stage. With asymmetric information after contract signing, the problem of moral hazard can occur. These two problems are central in the incomplete contracts literature, and the two subsequent sections will introduce these problems.

If a company were to try to foresee as many events as possible by gathering information, the contract theory states that the contract is incomplete because the information is costly and could be unavailable (Scott & Triantis, 2005). This is regarding the period the parties enter into the contract or if it should come to an enforcing court afterwards and is in line with the meaning an economist has of an incomplete contract. For the economist, the incompleteness of a contract is the transaction costs incurred while gathering information ex-ante and ex-post contracting. Ex-ante, the parties will try to foresee every future contingency and include a solution for every outcome in the contract. Ex-post, the costs are related to enforcement. The lawyer will, however, see the incompleteness of a contract differently. A

lawyer will see the contract as incomplete if it does not include the parties' obligation for all possible states of the world. A contract can therefore be "informationally incomplete" and "obligationally complete" at the same time if it states that a seller shall deliver, for example, a blue widget on date X and for price Y (Scott & Triantis, 2005).

There is a full body of literature on the matter of incomplete contracts. One author that has contributed heavily on this subject is Oliver Hart. Oliver Hart, together with Bengt Holmström, was in 2016 awarded the Swedish Riksbank Prize in Economic Sciences, in memory of Alfred Nobel, for their contributions to contract theory (The Royal Swedish Academy of Sciences, 2016). Oliver Hart has focused mostly on incomplete contracts and property rights, while Bengt Holmström focused more on the principal-agent problem and moral hazard problem. Other central authors are Oliver Williamson, Jean Tirole, Sanford J. Grossman, and John Hardman Moore.

During Hart's prize lecture, he highlights two examples from his work (Hart, 2017). The first example shows how the transfer of property rights could be beneficial with integration and how a hold-up problem can occur between two firms.

The example is based on possible problems for a power plant and a coal mine. The power plant needs coal from the coal mine to produce electricity and is located next to the coal mine for practical reasons. It is understood that this will be a long-term contract that will have to specify circumstances like quantities, quality, and prices for years to come. The power plant would want high quality coal to burn for its electricity, but this will be an incomplete contract because it can be hard to specify what high quality is. This situation can lead the two firms to renegotiate the contract. Here the "hold-up" problem that economists use arises. Because it will be cheaper for the coal mine to produce the lower quality coal, they will naturally demand higher prices to produce coal with higher quality and hold up the power plant. The hold-up problem for the power plant in this situation is that they are located right next to the coal mine, and buying coal from another mine from a longer distance could be expensive. The power plant is dependent on the coal mine in this situation. As it is difficult to write contracts to avoid the hold-up problem, even if it is anticipated in advance, the power plant could place itself more strategically. Alternatively, the power plant could get the key residual rights to the coal mine by buying the mine. This way, the residual control rights shift from the coal mine manager to the power plant owner. They could now decide on the quality of the coal themselves by ordering the manager of the coal mine.

There are, of course, some costs to this as well. The integration disempowers the manager, and the incentives for the manager to innovate and make relationship-specific investments will reduce.

The first example is based on private parties. The second example is about a private-public relationship, but many of the same ideas from the former example can be implemented here. The examples can also be extended to several assets and workers.

In the second example, the relation between the government and prison is examined. The government can either own the prison or contract with a private company. With the private company, factors like prisoner treatment can be covered properly, but the quality of the prison guards might be low. As the private company has residual control rights, and the contract is incomplete, they can hire unqualified and cheap guards to save money. The quality of the guards is comparable to the quality of the coal in the first example. In both cases, the contractor chooses an action that saves them money at the expense of quality for the power plant and government/society. If the government were to own the prison, they could forbid the employment of unskilled guards. On the other hand, if innovation, like the development of rehabilitation programs, is more important than violence (violence is a small problem, for example, low security prisons, and the recruitment of high quality guards is not as important), the private company would potentially be better.

Oliver Hart's work with the residual control rights started with a cooperation with Sanford Grossmann in the mid-1970s (Hart, 2017). This was when they realized an important question to the incomplete contracts. As there will always be missing things in the contract, who will have the right to decide about these things? This question led them to work with ownership and analyzing where it is most efficient that the ownership lays. Ownership is the party with the right to control and decide how an asset is used (to the extent that the contract does not specifically describe its use) (Hart, 2017). This led to a theory that describes the difference between contracts and firms.

Hart and Grossman developed a model based on this (see Grossman and Hart (1986)). Not long after, Hart and John Moore developed the model further based on new ideas (see Hart and Moore (1990)). The first example mentioned above is an illustration of the model. The two papers mentioned here are often referred to as "property rights theory" (Hart, 2017). In incomplete contracts theory, there are many different models that take into account various factors (like the state of nature and relationship-specific investment), but this thesis will not describe these models.

3.1.3.1 Adverse selection

Transaction costs and adverse selection occur when parties try to resolve information at the contracting stage (Schmidt, 2017). Adverse selection is a problem that occurs when the agent has private information. The principal will therefore try to reveal this information.

Adverse selection is typical in the insurance industry. If a group of people was to get life insurance, they all have different probabilities of unfortunate events. Assume further that the individuals getting the insurance are aware of their own risk probabilities, but this is unknown for the insurers. Based on

this, the insurer cannot distinguish between the individuals and must present the same offer to all (Arrow, 1973). At any price, high-risk agents (opportunistically) buy more, and low-risk agents buy less, making the actuarial expectations even more adverse and resulting in an inefficient equilibrium allocation of risk bearing (Arrow, 1973). To reduce the adverse selection, the insurers can gather information (at a cost), for example, by medical tests.

This differential information, as in the insurance industry, can lead to market failure (Arrow, 1973; Williamson, 1973). A perfect market would exist if possible to insure the individual with a bad lifestyle with a higher price.

3.1.3.2 Moral hazard

Moral hazard is a situation that can occur when the principal cannot observe the action or effort by the agent (Aghion & Holden, 2011). Hence the individual actions cannot be contracted upon (Holmström, 1979). A typical moral hazard problem arises when the agent is to take an action after contract signing, which directly affects the principal's pay-off. The agent's behavior is unobservable to the principal, who only observes a noisy signal, a "hidden action" (Schmidt, 2017). This unobservability makes it possible for opportunistic behavior by the agent (Howard & Bell, 1998).

The insurance industry is an example of this: When a person, the agent, has bought insurance against an accident, there is less incentive to take proper care to prevent accidents (Arrow, 1973; Holmström, 1979; Howard & Bell, 1998; Mirrlees, 1999; Schmidt, 2017). Moral hazard is also typical in the labor market when the firm cannot observe the effort made by their employee.

An optimal solution to the latter example is that the wage to the employee should be conditional on observable signals of the agent's effort and reward or punish them only when the result is based on the agent's effort. This solution is in line with the Informativeness Principle. A violation of the Informativeness Principle is when the employee is rewarded due to luck or not punished when responsible for losses (Schmidt, 2017). More information on the agent's performance will make sure there is minimal loss of risk-sharing benefits (Mirrlees, 1999).

Another example of a moral hazard problem is that after contract signing, the agent receives private information, which affects the agent's action. In this situation, the principal does observe the action but is unaware of the information this action is based on; there is "hidden information" (Schmidt, 2017).

3.1.4 Industry related standard contracts

To deal with problems of incomplete contracts, several industry related standard contracts have been developed. The use of these standards is increasing and is benefiting with the contracts being more alike (Brynhildsvoll, 2018).

There are different sets of standardized rules and conditions that can be used in contracts for the supply of a product is:

- Northern general conditions
- Orgalim general conditions
- Incoterms®

Northern general conditions are general conditions for the supply of machines as well as mechanical, electrical, and electronic products in the northern countries. The northern countries are Denmark, Finland, Norway, and Sweden.

These conditions are developed by the technology industry organizations in the northern countries. These conditions are meant to set the rights and obligations for both the seller and the buyer in a sale of a product. The technology industry organizations continuously monitor the need for new or revised terms.

There are two types of general conditions where one includes the installation of the product and one does not. The newest updated versions are NL 17 and NLM 19 (DI, Danmark et al., 2017, 2019). The number refers to the year of update (2017 and 2019, respectively), and the latter is the type that includes the installation. The two older versions were called NL 09 and NLM 10.

Orgalim is general conditions for the supply of mechanical, electrical, and electronic products in Europe. The first version made was based on the northern general conditions. After revisions of the two over the years, the conditions deviate more, but there are still great similarities. The Orgalim general conditions have become well established in the trade of European industry. The name was changed from Orgalime to Orgalim in 2019.

As with the northern general conditions, the Orgalim general conditions also have two types where one includes the installation of the product. The newest versions are Orgalim S 2012 and Orgalim SI 14 (Orgalim, 2012, 2014). The latter is the type that includes the installation. The two older versions were called Orgalim S 2000 and Orgalim SE 01.

Incoterms® is a set of rules used with the shipment of goods to distinguish risks and costs between the seller and buyer in national and international trade. Incoterms is short for International Commercial Terms and is used worldwide (International Chamber of Commerce, n.d.). Incoterms are published by the International Chamber of Commerce (ICC), and the newest version came in 2020. There are rules for any mode of transportation (Brynhildsvoll, 2018). These include 11 codes to represent when the risk and costs go from the seller to the buyer, see Figure 3.4.

SELLER	AGREED UPLOADING	TERMINAL	MAIN TRANSPORT	TERMINAL	AGREED PLACE FOR DELIVERY	BUYER	
<i>Rules for any mode or modes of transport</i>							
■	■	■	■	■	■	■	EXW - EX Works
■	■	■	■	■	■	■	FCA - Free CArrier
■	■	■	■	■	■	■	CPT - Carriage Paid To
■	■	■	■	■	■	■	CIP - Carriage and Insurance Paid to
■	■	■	■	■	■	■	DAP - Delivered At Place
■	■	■	■	■	■	■	DPU - Delivered at Place Unloaded
■	■	■	■	■	■	■	DDP - Delivered Duties Paid
<i>Rules for sea and inland waterway transport</i>							
■	■	■	■	■	■	■	FAS - Free Alongside Ship
■	■	■	■	■	■	■	FOB - Free On Board
■	■	■	■	■	■	■	CFR - Cost and Freight
■	■	■	■	■	■	■	CIF - Cost, Insurance and Freight
■	Seller		■	Buyer			

Figure 3.4 Incoterms codes (International Chamber of Commerce, n.d.).

The codes are divided into *rules for mode or modes of transport* and *rules for sea and inland waterway transport*. Relevant codes will be explained in the thesis, but it is referred to the International Chamber of Commerce (n.d.) or Brynhildsvoll (2018) for further explanation of the different codes.

3.2 Risk theory

Risk theory is comprehensive, and this chapter will only give an introduction to some central aspects relevant to the problem of this thesis. In the first section, risk definitions and concept will be accounted for, and it will be explained why it is important to include the background knowledge when assessing risk. Further, two common risk tools and the term “black swans” will be presented. In the second section, risk management will be presented shortly.

3.2.1 Introduction to risk theory

There is no common agreement of a definition of the risk concept today. Some see risk as independent of the analysts, while some see risk as subjective and dependent on the analyst's knowledge (Aven, 2014). Even if there is no agreed definition today, researchers are in broad agreement that one of the first formal definitions was De Moivre’s definition from 1711, which is still being used. His definition

says that “*the risk of losing any sum to be the product of the sum ventured multiplied by the probability of the loss, i.e., risk is defined as the expected loss*” (Aven, 2014, p. 23).

The use of expected values can be misleading for decision-makers in practice (Aven, 2014; Samset, 2014). The expected value for two completely different probability distributions can be the same. One can have the mass centered around the expected value, and the other one can have a more flattened curve with more severe outcomes. The risk management should clearly be different for these two situations, and hence risk cannot be described with only expected values. However, it can be useful in some situations to use it as a risk metric. Another reason to look beyond the expected value is the risk perception of the decision-maker. The risk perception includes personal feelings and affections. The different perceptions are risk averse, risk neutral, and risk seeking, as mentioned in chapter 3.1.1.3 about procurement risk.

Other risk definitions, than those based on expected values, are understood and based on aspects such as events, probabilities, and uncertainties. A growing number of researchers agree that the probabilities have a too narrow approach to be the main component of risk. Probability should be replaced in favor of uncertainty to broaden the risk perspective. Uncertainty can be defined as “*Imperfect or incomplete information/knowledge about a hypothesis, a quantity, or the occurrence of an event*” (Aven et al., 2018, p. 4). Uncertainty can be described as a subjective probability and be abbreviated:

(Q, K) ,

where Q represents the uncertainty measure and K is the background knowledge supporting Q (Aven et al., 2018). The background knowledge includes data, information, assumptions, and beliefs (Aven, 2014). Purdy (2010) and Aven (2015) use uncertainty in their definitions of risk: “*Risk is the effect of uncertainty on objectives*” and “*Risk is equal to the two-dimensional combination of events/consequences and associated uncertainties,*” respectively.

There are two types of uncertainty; aleatory and epistemic. The first is statistical uncertainty and is random. The latter is systematic uncertainty and is in relation to (lack of) knowledge.

When conducting an analysis of risk, the main intention is to describe risk. Therefore, it is important to understand what risk is before doing a risk analysis. According to Aven (2014, 2015) the risk concept is commonly abbreviated as:

(C, U) ,

and are the most suitable definition of risk in a general context. For some activity, there will be some consequences, C , but there are uncertainties, U , about what the consequences will be. Sometimes initiating events are taken out of C , and it is written:

(A, C, U) ,

with A being the initiating event (this A can be considered a consequence, which also can lead to further consequences, C). It can also be taken further to:

(RS, A, C, U) ,

where RS is the risk source. The three definitions are equal.

Aven (2015) uses an example of an urn, as shown in Figure 3.5, to illustrate the uncertainty (degree of belief) to the analyst.

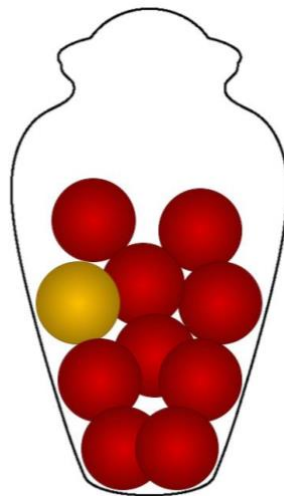


Figure 3.5 Urn example to illustrate the degree of belief of an analyst.

Say that the analyst is 10% certain of an event to happen, $P(A) = 0.1$, it means that the analyst is as certain of this as drawing one yellow ball out of an urn containing one yellow ball and nine red balls. To express more clearly that the probability of the event is based on a background knowledge, the probability can be written as follow:

$$P(A|K) = 0.1.$$

The strength of this background knowledge is important to include. The background knowledge can be based on weak or strong knowledge, and it is important to address this for the quality of the risk analysis. Aven (2015, p. 24) says, “*we need to see beyond probability to express risk*” and follows up with a simple example: Say a person is going to address the probability of a coin toss. If this is a normal coin, the person will say there is a probability of 0.50 for seeing head. The background knowledge, in this case, is strong as the symmetry of the coin is equal on each side, and experience supports this as well. Now, if the person were to address the probability of a coin he or her have never seen before, the situation is different. This coin could be of a different shape. If the person address the probability as 0.50 here, it could still be appropriate, but the background knowledge is weak.

To address this, a scoring system based on three categories can be used (Flage & Aven, 2009). The strength of knowledge is categorized as either weak, medium, or strong. Table 3.4 shows the conditions for weak and strong knowledge. Medium knowledge is cases in between these conditions.

Table 3.4 Weak and strong strength of knowledge (Flage & Aven, 2009).

Weak strength of knowledge (when one or more of these conditions are true)	Strong strength of knowledge (when these conditions are true)
Assumptions made with strong simplifications	Assumptions made are seen as very reasonable
Data/information are highly unreliable/irrelevant or non-existing	Data/information are available, and a large amount is reliable and relevant
Experts are in strong disagreement	Experts are in broad agreement
The phenomena involved are poorly understood, models are non-existent or known/believed to give poor predictions	The phenomena involved are well understood; the models used are known to give predictions with required accuracy

A common tool to illustrate risk (but not a risk analysis *method*) is a risk matrix. The risk matrix is two-dimensional, showing different consequence categories and the associated probabilities (Aven, 2014). Consequences are on one axis and probabilities on the other axis. See Figure 3.6 for an example of a simple risk matrix.

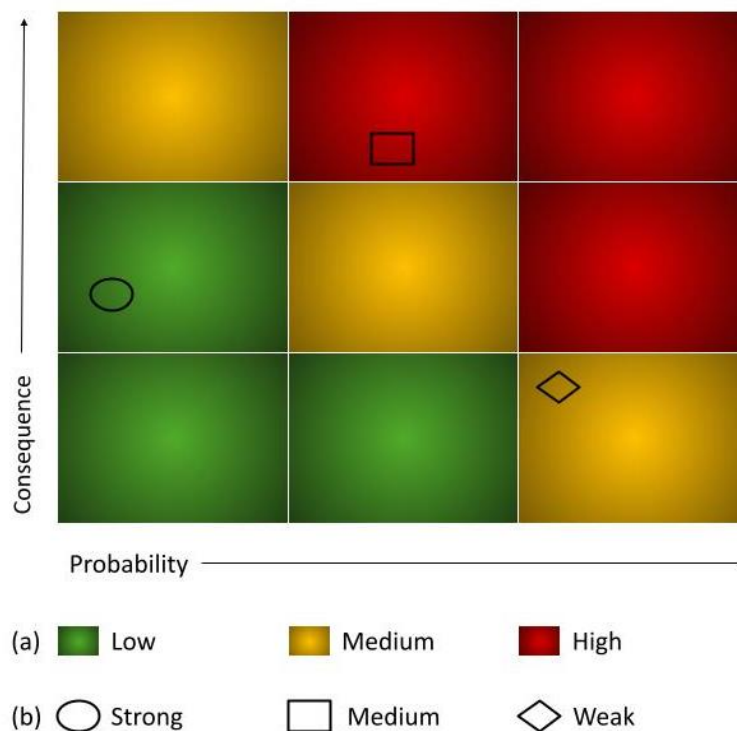


Figure 3.6 Risk matrix with (a) impact and (b) strength of knowledge.

It is difficult to see the strength of knowledge that is behind the assessment in a basic matrix. Two similar matrices could be based on both weak and strong background knowledge. The matrix in Figure 3.6 has included different symbols to illustrate the strength of knowledge that is behind. One must also be careful in how the categories are set, considering consistency to make sure the risk is correctly presented as the categories can be relatively coarse (Aven, 2015; NORSOK standard, 2001).

Aven (2015) points out that consequences do not restrict to negative consequences only but include the positive and wanted consequences as well, by the definition in his book. If the definition is restricted to only the negative consequences, it must also be determined what is seen as negative. Some situations could also be positive for some and negative for others. To account for this in the risk matrix, an opposite matrix illustrating the opportunities can be included.

As mentioned, the main intention of the risk analysis is to describe risk. Describing risk means to give an explanatory risk picture. The bow-tie diagram, presented in Figure 3.7, is a good way to illustrate the risk picture.

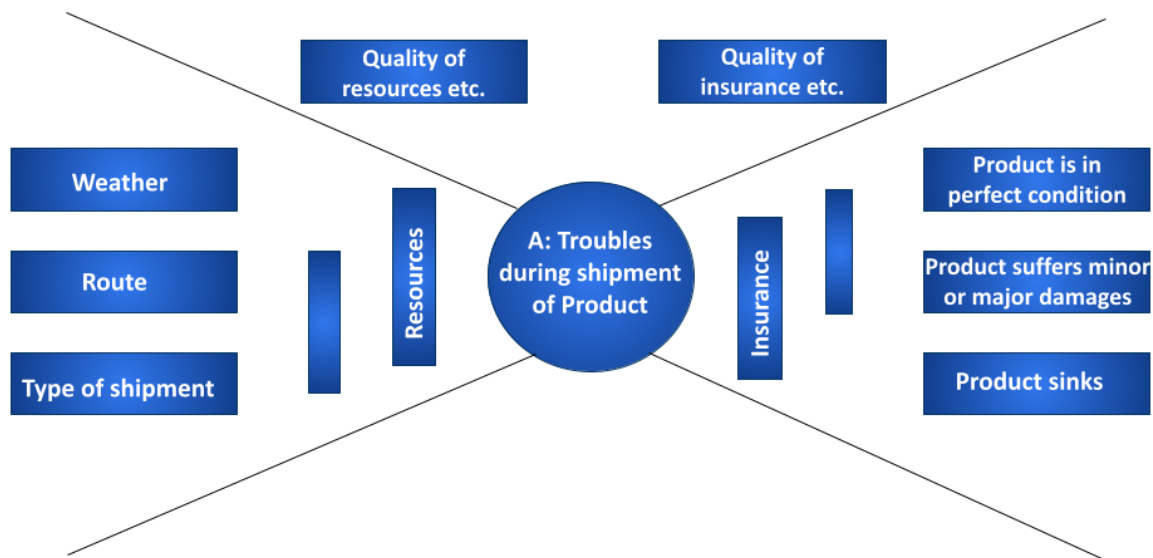


Figure 3.7 Bow-tie diagram (Aven, 2015).

As shown in Figure 3.7 the initiating event, A, is placed in the middle of the diagram. To the left side of A, it is shown what might lead to the occurrence of A, what the cause is, and to the right, the consequences of A are shown. There are some barriers on both the left and right side. The barriers on the left side are preventative barriers meant to lower the probability of the event from happening. The barriers on the right side are to reduce the undesirable consequences should the event happen.

A cause and consequence analysis form the basis for the risk picture. The risk picture gives an overview of predictions, probability distributions, the strength of knowledge, and manageability factors (Aven, 2015). To complete the risk picture, sensitivity and robustness analyses should be done. Several assumptions are made during risk analysis, and these analyses will reveal how dependent the results are on these assumptions.

Some events might not be anticipated in advance and come to the assessor as a surprise. There are several ways of classifying surprises. There could be an anticipated event that can come as a surprise to the assessor if the assessor considered the occurrence of the event as very unlikely. The term black swan is often used in relation to these kinds of events and is defined by Aven (2014, p. 116) as “...a *surprising extreme event relative to the present knowledge/beliefs.*” Taleb (2010, p. xxii) defines the black swan term with three characteristics:

“First, it is an outlier, as it lies outside the realm of regular expectations, because nothing in the past can convincingly point to its possibility. Second, it carries an extreme impact. Third, in spite of its outlier status, human nature makes us concoct explanations for its occurrence after the fact, making it explainable and predictable.”

In the first example of the unanticipated event, it is unknown to the assessor based on his/her knowledge but could be known to others. This is called an unknown known type of event. The other example of a surprise, the unlikely event, is the type of event that is known but believed to not occur because of low probability. There is a third type of black swan event that is unimaginable to the assessor and is called an unknown unknown. Figure 3.8 summarizes the different types of black swans.



Figure 3.8 The three categories of black swans events (Aven, 2014).

3.2.2 Risk management

Risk management includes all attributes regarding managing risk, both avoiding the negative consequences and exploring the opportunities (Aven, 2015). It is often divided into three main categories: strategic risk, financial risk, and operational risk. The risks from these three categories are where the consequences of the project or company are affected by business decisions, market influence and issues with credit and liquidity, and issues related to safety or security, respectively.

The International Organization of Standardization (ISO) has presented standards to risk management. These sets of standardizations are called ISO 31000. Figure 3.9 shows the setup for the risk management process from ISO 31000:2009 (Purdy, 2010).

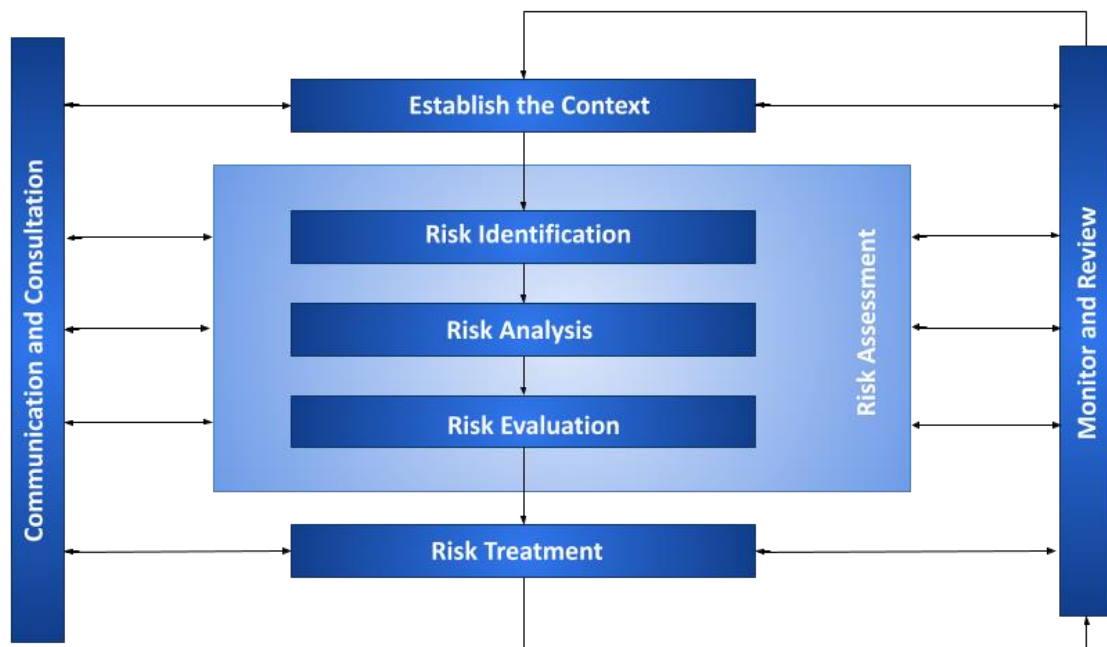


Figure 3.9 Risk management process from ISO 31000:2009 (Purdy, 2010).

Aven (2015) presents a risk process that is of similarity to the risk management process from ISO but refers to it as the risk analysis process. This process is divided into three main steps; planning, risk assessment, and risk treatment, as shown in Figure 3.10.

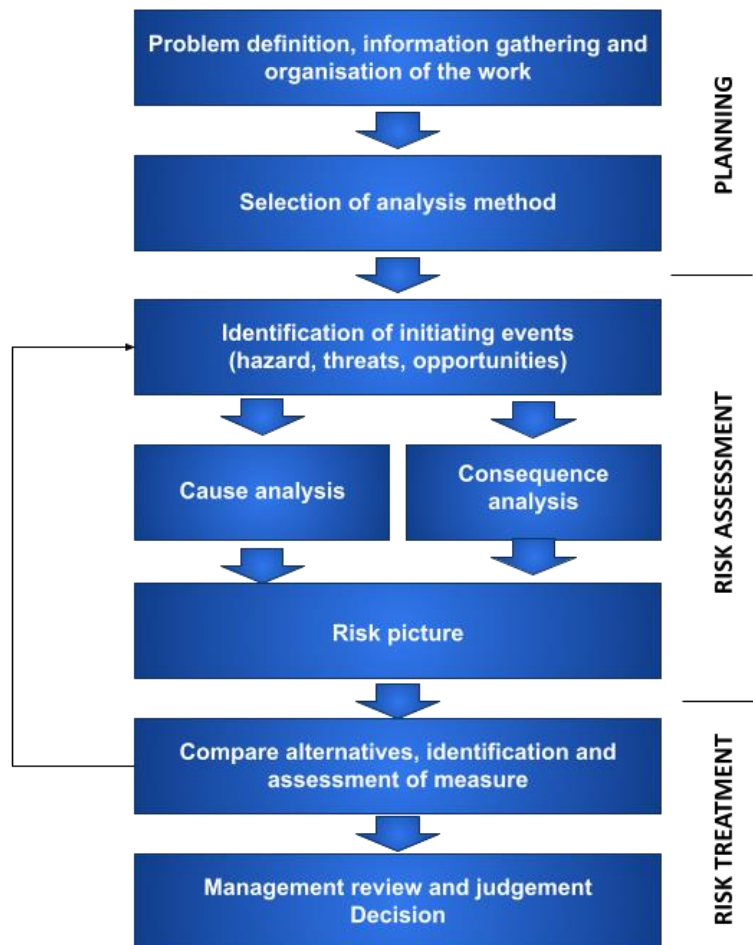


Figure 3.10 The risk analysis process (Aven, 2015).

The risk analysis process is carried out to give a description of risk and then to support decision-making. In this process, several analysis methods can be used. Some analysis methods are coarse risk analysis, Job Safety Analysis (JSA), Failure Modes and Effects Analysis (FMEA), Hazard and Operability studies (HAZOP), Structured What-If Technique (SWIFT), fault tree analysis, event tree analysis, Bayesian networks, and Monte Carlo simulation. See Aven (2015) for the description of the risk analysis process and methods.

4 Method

The methods used for this thesis are qualitative. These are preferred methods when the intention is to get more detailed and comprehensive information. The main difference between qualitative and quantitative methods is the level of detail. The results cover a broader specter with quantitative methods but will be less detailed (Johannessen et al., 2020). Developments in social research move in the direction of more qualitative methods, both in Norway and the rest of the world (Tjora, 2021).

Most of the guidance on methods for this thesis is based on the book *Qualitative research methods in practice*² (Tjora, 2021), which is well used in higher education and has received good attention internationally. Other sources are *Research methods for economic-administrative subjects*³ (Johannessen et al., 2020) and *Case study research and applications: Design and methods* (Yin, 2018).

The method for the research must be chosen based on how to reflect best the problem statement for the research (Tjora, 2021). The following subchapters will account for the methods used for this thesis (case study, document study, and interviews) and how they are completed. The literature collection will also be accounted for. Then, the quality of the study will be addressed.

4.1 Single case study with multiple analysis units

One of the methods chosen for this thesis is a case study, which limits the qualitative research by the environment and is a common form of refinement in qualitative studies. Other examples of how qualitative research can be limited are phenomena, type of informant or perspectives, and theories (Tjora, 2021).

A company is an example of a case study (Johannessen et al., 2020; Tjora, 2021). Case studies can be categorized over two dimensions with single or multiple case studies and one or more analyzing units (Yin, 2018). A single case study is chosen for this thesis, and the company for the case study was presented in chapter 2. There is no interest in finding a general design for sales contracts considering these will most likely be suited for the specific company. By looking at one company's sales contracts and processes opens for more in-depth details. However, it can be relevant for other companies regarding similar processes.

There are three analyzing units used for this thesis; document study and interview of two types of managers within Company (sales managers and project managers).

² Translated from *Kvalitative forskningsmetoder i praksis* (Norwegian title).

³ Translated from *Forskningsmetode for økonomisk-administrative fag* (Norwegian title).

4.2 Data collection

The case study already uses existing limits, but the question of which data generation or analysis choices remain (Tjora, 2021). This can be compared to the analyzing units from Yin (2018).

This report wishes to analyze the sales contract for a company, and analyzing these documents might have been enough when going into details of several contracts. However, the contracts are based on other documents and are a result of company processes. Therefore, it is seen as necessary to include these as well. With the given time and resources, the interview method was chosen to overview the other documents and company processes, and to get opinions on the sales contract that is not possible to read from the contracts. In case studies, it is recommended to include several methods for data collection (Tjora, 2021; Yin, 2018).

The data collection, therefore, consists of both an unobtrusive method (document study) and an obtrusive method (interview) (Tjora, 2021). These two methods can also be distinguished between an inductive approach and a deductive approach. The first approach is the interviews, and the second one is the analysis of the contracts. An inductive approach is when the work is from data, that is, empirical, to theory. The approach is empirically driven. The inductive way is the opposite, where the work is from theory and towards the empirical and is hypothesis-driven.

4.2.1 Document study

Four sales contracts are the basis for the contract analysis, and these are contracts for the same type of Product with Company. These contracts will be categorized as case-specific documents (Tjora, 2021). The contract analyzing chapter will give a presentation of the contract design (ref. 5.1.1).

The analysis is based on contract and risk theory, comparison with general conditions (ref. 3.1.4), and impressions by the author. The contract analysis was done before conducting the interviews, so the analysis is not influenced by interview thoughts.

4.2.2 Semi-structured interview

There are three main ways of performing a qualitative interview; unstructured, semi-structured, and structured interviews. The interview chosen for this thesis is semi-structured, which is also the most used interview type in qualitative research (Tjora, 2021). The pros of this type of interview are that the interviewer will try to be flexible and adaptive to the conversation. The reason it is chosen for this thesis is the flexibility and to add some structure to the questions to ensure coverage of essential aspects.

4.2.2.1 Recruitment of interviewees

The recruitment of interviewees was done through email, containing a presentation of the interviewer, the subject of the interview, and interview conditions. The email explained that the meeting would most likely be over Teams for about an hour. It was asked if the person was comfortable recording the conversation and explained that there is complete understanding if this is uncomfortable. If this were not desirable, the interview would be conducted without recording. All interviewees were ok with the recording. The recording was used for transcription the same day. The following morning the transcription was gone over in full one last time, and the recording was deleted.

Before the agreed interview, a document was sent to the interviewees, presented in appendix A, with a description of the interview. The document was originally in Norwegian but translated for the thesis. This document summarized some of the information given in the first email and the categories for the interview. It was meant as an explanation and preparation in advance of the interview. The categories were presented to make the interviewees think about the matter but not include any questions to prevent them from rehearsing answers in advance.

4.2.2.2 Interview guide

When conducting the interviews, an interview guide was used, presented in appendix B, which includes prepared questions to structure the interview. The interview guide is divided into five categories; background, challenges with the contracts, risk allocation, the process before contract signing, and lessons learned. Each category starts with open questions to see what the interviewee first thinks regarding the matter. By asking open questions, the interviewee might also talk about other things that may prove relevant to the research (Tjora, 2021). Some questions have sub-points to make sure this is covered or to clarify if needed.

There may be deviations from the interview guide during the interview due to the interview being semi-structured. The same guide was used for all interviewees, but some questions were emphasized regarding the relevance for the individual interviewee. The order of the questions could also deviate to make sure the most important questions were covered most properly. Lastly, it was asked if the interviewee had anything to add and thanked for participation.

4.2.2.3 Conducting the interviews

There were a total of 4 interviews completed, as shown in Table 4.1 with interview information.

Table 4.1 Interview information.

Interviewee nr.	Interviewees position with Company	Date	Type of interview
1	Senior project manager	15.04.21	Teams meeting

2	Regional sales manager	27.04.21	Teams meeting
3	Project manager	06.05.21	Phone call
4	Sales manager	12.05.21	Teams meeting

It was important for the data collection to have different points of view in the interviews, and two sales managers and two project managers were interviewed. With case studies, the criteria for the candidates are already naturally delimited. Still, it might be an idea to narrow further in organizational studies, that is, company case studies, by picking out subgroups of potential interviewees for more consistent interview data (Tjora, 2021). A criterion for picking out the informants was that they must be in contact with Product of the analyzed contracts.

The interview took place over Teams or by phone call. It would have been preferred to do the interviews in person, but restrictions and uncertainties regarding the Covid-19 pandemic made this approach the best. The interviewees are professionals who are used to meetings, and over the past year and so, used to meetings online due to the pandemic. Therefore, it was assumed and perceived that the interviews had no or limited negative effect from not being in person. One of the interviewees mentioned that they often had online meetings with cameras off in case of bad quality. Therefore, the phone call is assumed and perceived to be of the same standard as the other interviews conducted over Teams. The subject for the interviews was also not a sensitive and personal matter, and body language is assumed to be of less importance. Still, when transcribing the interviews, it was noted if there were any parts of the interview where they hesitated, raised their voice, or similar. A plus with a Teams meeting for the interviews is that a recording device will not be visible and possibly stress the candidates. The length of all the interviews was approximately 1 hour.

4.3 Literature collection

The theory behind this report is from the university curriculum in relevant courses and literature collection of books and articles from relevant databases through Oria. Most articles are from the database Business Source Complete and some from JSTOR. When searching, relevant keywords were used, or a book or article title was found in other articles. A criterion for the articles was that they are peer-reviewed. It was searched for review articles to get an overview and tips for further searches.

4.4 The quality of the study

The quality of the study will be accounted for here in the form of reliability and validity (construct, internal and external). These four tests for judging the quality of the research design are relevant for case study research (Yin, 2018).

4.4.1 Reliability

Reliability is whether or not another person could produce the same results as the report's author with the same data collection methods (Yin, 2018). The reader of this report does not have access to the background material, the contracts, which negatively affects the reliability. If the reader had access, there is the issue of subjective interpretations of the contracts. Regarding the interviews, the reader would be able to get somewhat the same information using the interview guide presented in appendix B, with access to the same interviewees (which is anonymous in this report).

The author's prior knowledge and position are important for reliability (Tjora, 2021). It shall not be disregarded that the interpretations of the general conditions to the contracts can include errors as the author of this thesis has no legal background. On the plus side, the author of the thesis does not have any relation to Company and is therefore not influenced in that matter.

4.4.2 Validity

The validity of the study is regarding the relevance of the data collection to answer the problem statement. It can be distinguished between construct, internal and external validity (Yin, 2018).

Construct validity reflects on whether the set of operational measures used are suitable for the study. This is difficult in case studies, and a tactic that can be used is using several sources of evidence (Yin, 2018). Regarding the sales contracts for Company, both documents and interviews have been conducted to find results. For the processes around the sales contract, the data collection only relies on the interview information.

Internal validity investigates the causal relationship between different events but is mainly for explanatory studies (Yin, 2018).

External validity looks at how the case study's findings can be generalized. A single case study limits how high the degree of generalizability can be (Johannessen et al., 2020; Tjora, 2021). However, companies with the same kind of procedures in a back-to-back relation could benefit from the findings. For companies using the same standard of general conditions, it is certainly relevant.

5 Results

The analysis chapter will first go through the analysis of the sales contracts for Company, followed by the findings from the interviews.

5.1 Contract analysis

This chapter will give a detailed analysis of the sales contracts used by Company for their Product (see Appendix C for a summary). The sales contract is the contract between Company and its customer, see Figure 5.1. Company's procurement contract with the shipyard is not a part of the analysis. However, the shipyard will be mentioned throughout the analysis, in the interview findings, and discussed further in the discussion chapter. The analysis is done in light of literature mainly from contracts theory and risk theory. Uncertain aspects and ambiguities of the contracts will also be pointed out. The foundation for the analysis is four contracts between Company and four different customers.

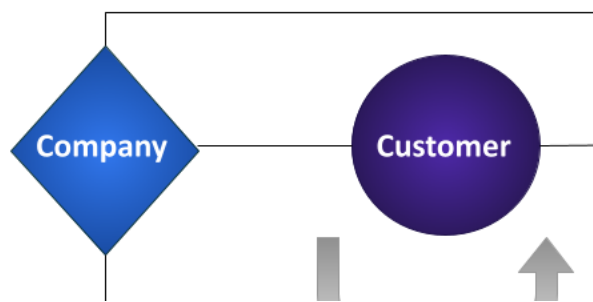


Figure 5.1 Company and customer (clip art from Figure 2.1).

The analysis chapter will be divided into four subchapters. The first subchapter will give a presentation of the design and content of the contracts. The following chapters will be based on the division in the contracts that are presented here. The second subchapter will first present an overall view and comparison of the contracts about changes and misspellings, among other things. The third subchapter is about the specifications of Product that is included in the contract. The specifications of Product are what type of Product it is and the extra equipment that is included. The fourth subchapter is about the general conditions used in the contracts, which is presented in the theory chapter. The contracts refer to one of these general conditions and highlight some clauses from the conditions in the contract. This subchapter will go through all the conditions presented in the contracts and comment on a few clauses from the general conditions not included in the contracts.

5.1.1 Presentation of the contract design

The contracts are pretty similar in their design, with only one that stands out compared to the others. The length of the contracts varies from a total of 9 to 14 pages, including any appendixes. See Figure 5.2 for an illustration of the contract design.

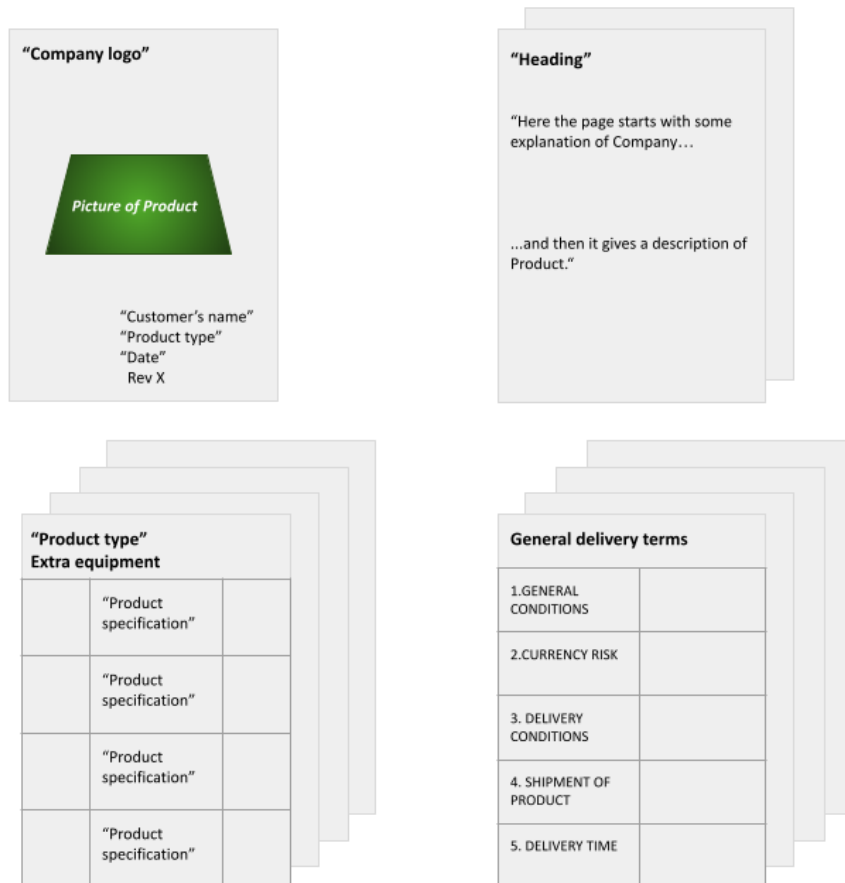


Figure 5.2 Illustration of the contract design.

Figure 5.2 shows that the contracts start with a front page that presents the customer’s company, what type of Product, and the date of the tender. Before both parties sign the document, it is referred to as a tender. The last page states that the document can be converted to a contract by the signature of both parties (this includes the initials on all pages of the document as well). Further in this analysis, this document is referred to as the contract. If there are any revisions of the contract, this is presented on the front page as well.

All the contracts start with a presentation of Product and how this is special for this Company. Three out of four contracts have this presented over two pages with text and paragraphs. Over the following pages, ranging from three to six pages, tables show what the offer includes. This content first presents what kind of model Product is and its extra equipment. Then, a short explanation of the installation, commissioning, training, and service agreement included with Product is presented. Next, these three

contracts present the general conditions, which are of similar length. They present the same points of conditions, but the content can vary to a small degree. After this, the place for signature with name, title, place, and date is presented. Only one of these three contracts includes a general arrangement (GA) drawing.

Lastly, the fourth and slightly different contract, have also included what type of Product and tables of its extra equipment. It is only divided into smaller tables and referred to as the specifications of Product and not the extra equipment (the analysis will use the word specifications when referring to this). The general conditions are then presented, with a similar setup and points of conditions. Different from the other three contracts is that the specifications and conditions are presented as appendixes. This contract starts with a table of content. Then the contract has nine pages with text and paragraphs that present information about Product. It can appear that this contract includes more information than the others, and in some parts, it does, but a lot of the information here is included in the tables in the other contracts. For example, the installation, commissioning, training, and service agreement are not in four different tables here, as in the other three contracts, but are presented on one page with coherent text.

5.1.2 An overall view and comparison of the contracts

5.1.2.1 The compensation format

The chosen compensation format for the contracts is fixed price (lump sum). The fixed price is an expected chosen compensation format for this Product, as it is thought of as a good with well-defined technical requirements and limited customer involvement. These examples are supported by the theory presented about compensation formats. With this type of compensation format, most of the risk is with the contractor, that is, Company.

5.1.2.2 Changes and revisions

In the negotiation between the customer and Company, there are changes made to the contract before both parties sign. Revisions (and renegotiations) will naturally occur as incomplete contracts are written (Hart, 1995). These changes are shown in the contract by either specifying the revision number on the front page or highlighting the contract's changes as bold text (the contract specifies that this is what it means). Some of the contracts also have both. By comparing the contracts, it is noticed that the contract with the most revisions is the one that appears to be the neatest and has no bold text. One of the contracts has no revisions but has the most bold text and appears less neat. Perhaps the revisions made the neatest contract more clear.

Some specific text in the contracts seems to be highlighted in bold text as a standard (like the time of delivery and validity of the contract). This standard could be mixed up with the bold text that is meant for the changes.

The revisions and bold text changes could indicate no formal process for how the changes in the contracts are made and presented. It must be emphasized that the customers can be very different in how specific they would like the contracts. On the other hand, this is something that Company could facilitate to better the process.

5.1.2.3 References

Several of the contracts have a reference made in the specifications tables without an attachment in the contracts. Examples of this are the GA drawing or an option the customer can choose (see 5.1.3.3 for options). The customer might have access to this through a previous email and know what this is. However, another person who was not on this mailing list will not know the content and must ask around to get information. It would be easier and more well-structured if this were part of the contract (for example, an appendix if it is much information).

Some contracts refer to a standard of the customer's company, for example, a standard for the kitchen in Product or a specific color. There could be a risk to this as the standard is not specified. The contract time spans over several months, or also maybe years, and leaves time for this standard within the customer's company to change. It is uncertain if any changes to the standard after contract signing can be verifiable ex-post and could make room for the customer to behave opportunistically.

Some contracts also refer to old deliveries, like the materials that were used for that particular product. As this Product is relatively easy to compare physically, this reference will not leave any significant uncertainty. On the other hand, it is unsure what delivery it is referring to. This reference will not be clear for all who need to read the contract, and they would use unnecessary time figuring this out. Perhaps the contract should mention the project number this delivery had.

5.1.2.4 Copy-paste versus standard template

Two of the contracts are of the same type of Product, and it is noticed that they are of greater similarity than the other two contracts. An obvious reason here is because Product is of the same type, but because many Products are "active custom," another reason could be that the newest contract used the older version as a base and changed it as needed. Other reasons supporting this are that these two contracts have some of the same misspellings, and they both refer to the same customer when one of the contracts should have changed this to the customer of that specific contract.

This "copy-paste method" is unfortunate for the latter example. New contracts should not be based on older versions for reasons like this, but rather a standard template or a system of some kind for easy inputs or something similar. If they were to implement some changes from lessons learned from a project or upgrade certain specifications for a product, it would be easier to change the template/system. From the standard Product, there will naturally be some differences in their equipment, as the different

Products will cover different needs with different customers. There could be “packages” or some specifications that only belong to a particular Product variation to facilitate this.

5.1.2.5 Wording

When the contract writes phrases similar to “and such” and “this must be clarified,” ambiguities can arise. The incomplete contract literature discusses many cases of whether situations are verifiable ex-post or not. The situation might be verifiable but the situation making this clarified is not clear, at least not to a third party. If this is something that the parties cannot figure out at the time being, perhaps it should be pointed out that the matter should be settled with a variation order (VO) after contract signing. This procedure might be cumbersome, depending on what must be clarified, but then the contract specifically refers to a document.

5.1.2.6 Risk allocation with the shipyard

Company uses a subcontractor for the production of Product and does not have direct control over the production process. It is the shipyard that is in control of this production. The risk allocation should therefore be reflected accordingly. Risk theory says that the risk should lay with the part that can handle the risk. Some of the risks should therefore be shifted to the shipyard in control of this process. Because Company is an intermediate between the customer and the shipyard, they will take the role as both a principal and an agent, based on which relation is under analysis. Subcontractors will act as agents of the contractor, that is, Company when hired by the contractor to help meet their obligations (Howard & Bell, 1998).

The risk allocation needs to be correctly reflected in the sales contract (and the procurement contract). Further in the analysis, it will be discussed where it is relevant, which party the risk seems to be with, and where it should be.

5.1.3 Product specifications

5.1.3.1 Specification responsibility

Scott and Triantis (2005) list some reasons why parties might contract, and one of these is that the parties can then shift the risk between each other and may benefit from this. Company specializes in complete technical solutions for its customers. Some of their tasks are to understand the customer’s needs, negotiate the specifications of Product and then have this correctly passed on to the shipyard. Therefore, it is thought that the responsibility of Product specifications is with Company. Any documents in regards to this should be clear and understandable for both the customer and the shipyard.

The contracts include installation, commissioning, and training for Product. These examples are work performed by Company, and the performance of this work will be Company’s liability. Because this

work comes after the production and shipment of Product, those parts must be done properly. The FAT should be done carefully to make sure the production is done properly. The shipment is either done by the customer or another subcontractor (more on the shipment of Product in point 4 under 5.1.4.1 clauses specified in the contracts).

5.1.3.2 *Specification structure*

There are many specifications regarding additional equipment to Product in the contract, listed in tables. By systematically grouping these specifications, it shows that some are repeated in all the contracts, and some are entered in just some of the contracts. Therefore, the quantity of the specifications is different. The length of the information about each specification also differs from contract to contract. The grouping of the specifications in tables can also be different.

It is noticed that the main thing that differs between the contracts, that is made through the negotiation between customer and Company, is the level of detail the customer wants to have the specifications described.

5.1.3.3 *Options*

Common to all the contracts is the way they list the options. An option is a contract where the buyer has the right but is not obliged to buy an underlying object to an agreed price (Korsvold & Høidal, 2017). The options in the sales contracts are a list with alternatives (for example, other Product specifications or shipment of Product) the customer can choose to implement after contract signing. The options are presented with a short title and a price if the customer were to choose this. There are no details about the options in the contracts, except for one contract. Perhaps this is communicated in advance, and the customer has all the specific details they need for making this decision. Or, more likely, more information will be given at a later time. It is nevertheless not specified in the contract. Nor is it clear if the option is chosen.

The contract that has included information about the option has also included that more information will be given over Teams and that the options need to be chosen with a variation order. A second contract also includes that the option can be chosen afterward with the project manager. A third contract does not have this included but states the time for the option. The fourth contract has neither. The different types of options might need different levels of detail, but the contracts should be consistent with time and implementation through a VO.

5.1.4 The general conditions

The analysis refers to the general conditions Orgalim SI 14 and NLM 19 presented in the theory chapter and the older versions of these: Orgalim SE 01 and NLM 10. These are the conditions that include the installation of Product. If the text says general conditions, the clauses are the same in all four versions.

It will be specified where it is relevant when there are differences between these versions. Incoterms will also be mentioned.

The analysis will first go through the general conditions presented in the contracts (17 points called *the general delivery terms*) and then discuss some of the liability that Company has based on other clauses from the general conditions.

The analysis is done based on the assumption that the two tests mentioned in the general conditions, *before shipment test* and *taking-over test*, is corresponding to the FAT and CAT in the sales contracts, respectively. The taking-over test must not be confused with the taking-over of Product as this is based on the chosen trade term from Incoterms.

5.1.4.1 Clauses specified in the contracts

1. GENERAL CONDITIONS

Under this point, the contracts refer to the type of general conditions applicable to that contract. The conditions used in the contracts are Orgalim SE 01 and NLM 10. Two of the contracts that use Orgalim SE 01 have not stated whether or not this is Orgalim S (supply) or Orgalim SE (supply and erection). This missing is probably of some minor detail, as there is no Orgalim S 01, but it should be clear. The newest versions of the general conditions are available at the time of these contracts, so the contracts use an older version of the conditions. The use of an older version is done on purpose as this version was preferred. However, this may not be clear for the customer and could leave them the impression that Company is not “up to speed.” The version used is perhaps not a big issue but could reduce the overall impression of the tender presented to the customer. Perhaps they could use the newest version and change some of the clauses as wanted.

There are 33 changes done to different points in the new version, NLM 19, compared to the older version, NLM 10. The changes are based on corresponding provisions from NL 17 and simplifying the language (DI, Danmark et al., 2019). The new changes made to NL 17 are based on, among other, new case law to open to the ordinary court in disputes over minor values and clarify the supplier’s liability in the event of an infringement of intellectual property rights (DI, Danmark et al., 2017). Both parties agree on the use of the older version when signing the contract.

The contracts point out that these conditions are used unless specified otherwise, which is in accordance with the conditions. It is possible to change the clauses in the conditions as long as both parties agree to it in writing. The contracts have some deviations from the general conditions, but it is not specified in the contract where this is the case. To leave no ambiguities, this could be pointed out.

2. CURRENCY RISK

The contracts state the exchange rate they use between Norwegian kroners and the foreign currency for the offered price in the tender. It also adds that this price will be changed after contract signing to a value after currency adjustment. Company does this because they have subcontractors in foreign countries. The way Company secures the currency is by buying the currency of the shipyard's country to a specific exchange rate. The purpose of securing is to reduce risk (Korsvold & Høidal, 2017).

The securing of the currency normally happens the same day, or the day after, contract signing. The risk for a considerable currency change is, therefore, minor. The day for currency adjustment is not stated precisely in the contracts. Just that it will happen as soon as practicable after both parties have signed the contract, leaving Company some openness to when the adjustment happens in case something unexpected should occur. One of the contracts does not include this and states that the currency adjustment happens when Company receives a possible signed contract. This statement leaves it open to interpretations if the adjustment should happen once, for example, the same day Company receives a signed contract from the customer and if both parties should have signed it. All the contracts should be coordinated here.

If the currency adjustment was not included in the contract Company could face major costs if the currency changed from the time they contract with the customer to the time they contract with the shipyard. This risk is because the customers have some time from when they receive the tender proposal with an offered price to when the deadline is (the validity varies in the contracts). This way, they could also face major cost savings, depending on whether the currency rises or falls. This example is a good example of how risk should not only be associated with negative scenarios but that it could give room for an opportunity too. This case also makes it clear how a situation can be negative for one party and positive for the other party.

The currency risk is a risk for the customer as they are not fully aware of the final price at contract signing. The price can both rise and fall after currency adjustment.

This point is something Company has included themselves, as this is not found in the general conditions. The general conditions do mention any sub-suppliers, but nothing regarding the currency specifically.

3. DELIVERY CONDITIONS

All the contracts use the trade term Ex Works (EXW). The contracts with the NLM 10 conditions specify this under this point, and the contracts that use Orgalim SE 01 specify this under the delivery time point (see point 5). EXW means that all risks and costs are shifted to the buyer once Product is completed in the shipyard, not cleared for export, or loaded on vehicles. Therefore, the risk with delivery will lay with the customer, and Company has no liability to what happens during delivery.

With the EXW, the seller gives the buyer access to the completed Product in their premises, the shipyard. Three of the contracts specify the shipyard. Having this included in the contract could be interesting for the customer as the risk and cost of delivery lie with them. The risk will be different according to where the location of the shipyard is considering the route for delivery. Innovasjon Norge⁴ (Innovasjon Norge, n.d.) states that it is important that the sales contracts always specify the place for the exact point of delivery of the goods and the time. Specifying the shipyard presupposes that Company has negotiated and chosen a specific shipyard at this point. Company will not sign a contract with the shipyard before the customer signs the sales contract, which is important because of specific investments. Should the customer choose not to sign with Company after Company has signed with the shipyard, the investment would most likely not be of interest anymore.

There is a difference regarding the trade term in the two versions of Orgalim general conditions. The newest version uses Free Carrier (FCA), while the older version uses EXW. The conditions say that these trade conditions are applicable when the trade term is not specified in the contract. Using the trade term FCA, the risk would be with Company longer; until the customer's transport company receives Product. If Company were to use the newest version of the general conditions, it would have to specify that the EXW trade term is applicable to avoid this additional risk.

Two of the contracts include the shipment (the two others mention that they can handle this for the customer), but they inform that in case of possible demurrage,⁵ the customer will be re-invoiced the extra costs incurred per hour beyond 36 hours.

Company uses another supplier to handle the delivery for them. Considering that Company does not have direct control over the employees here (and the weather, for that matter), it will be safe not having the risk and liability in this situation. It is more difficult to monitor an agent who is an independent subcontractor than an agent who is an employee (Aghion & Holden, 2011). More on the shipment in the next paragraph.

4. SHIPMENT OF PRODUCT

The shipment of Product is not done by Company's employees but by a subcontractor. As mentioned, the risk should therefore not be with Company. The sales contract reflects this through the trade term EXW. When Company fixes the shipment, the intention is to handle this on behalf of the customer as Company has experience with this. The contract with the subcontractor is not a part of this analysis.

The shipment of Product is handled a little differently in the contracts. Two of the contracts have included the shipment in the contract. One states that this will be agreed upon in another document (and

⁴ Translates to *Innovation Norway*.

⁵ Demurrage is remuneration from the charterer to the shipowner (the charterer) because the ship remains in port beyond the time stipulated in the agreement ("demurrage," 2021).

priced separately), and the last one has the shipment as an option. The option states only that this can be included and shows the price and some possible extra costs. Another option in the same contract states that a variation order will include the option. It is assumed that the same goes for the shipment order option. The options do not include a deadline for the decision to include the option or not. Naturally, the variation order for a possible shipment can come to the end of the project. However, because Company uses another supplier and most likely has several Products to deliver, it might be essential to know this early on for better planning.

As Company uses EXW, the risk during shipment is with the customer. However, the two contracts, including the shipment, have included a paragraph that starts with *important*, bold and underlined and explains this carefully. It mentions that the shipment is done on the customer's behalf and that Company is in no form liable for any damages. The contract stating the shipment will be agreed upon in another document also mentions that the shipment is done on the customer's behalf, but not as carefully. This text should make it very clear for the customer that the risk during shipment is with them.

5. DELIVERY TIME

The delivery time in the contracts is the time Product is completed in the shipyard and ready to be shipped. It is based on estimates Company receives from the shipyard and is stated as either a day, week, or month. Therefore, the risk for this to not hold should lay with the shipyard, as long as they are responsible. This point does mention the shipyard and states that the delivery time is conditioned on their production capacity at the time of the order. The overall impression in this point is that Company tries to make it clear that the time is only an estimate and that the customer should be aware that several conditions can change this estimate. The procurement contract with the shipyard should be consistent with this.

The property rights theory regarding nonhuman assets supports that not all activities should occur in a single firm (Hart & Moore, 2007). It states that the owner of the asset possesses residual control rights over that asset. Because of this, the allocation of these rights can be optimally divided.

The contracts specify that the delivery time is conditioned on receiving confirmation about adequate financing from the customer. This confirmation will help reduce the risk of missing payments regarding the customers' ability to pay.

As mentioned, the contracts use EXW, either stated under this point or a previous point (or both). The delivery time for EXW is defined as when Product is completed in the shipyard. With this in mind, this point also includes specifics regarding the delivery time of Product from the shipyard to the customer's location. It might be clear what is what, but there could also be an ambiguity here regarding what the delivery time is referring to. This information could perhaps be moved to the point regarding the

shipment of Product. Also, as the shipment is dependent on the delivery time of Product in the shipyard, the *delivery time* point could be presented before the *shipment of Product* point in the contracts.

All the contracts include that Company is in a force majeure situation at the time (one states this under point 1.). Company disclaims any liability for a delayed delivery no matter the reason. They specifically point out reasons like liability for liquidated damages and that delayed delivery gives no right to the customer to end the contract. The general conditions regarding force majeure include that the referred circumstances shall only give a right to suspension if the effects on the performance of the contract could not be foreseen during the time of contract establishment. Is it then correct to say that Company is in a force majeure situation? That the effects of Covid-19 are force majeure? The world is in a unique situation with the pandemic, but it is no longer an unforeseen situation. The contracts were signed approximately 4-6 months after the virus came to Norway, and the situation was more uncertain at that time. However, it could still give rise to unexpected effects. Perhaps the content should be reformulated to this meaning.

Situations like this are a basis for discretionary assessments and can therefore be challenging to handle. Macaulay (1963) points out that if there is a problem, you should call the other part and deal with the problem rather than using legal clauses to handle the problem, that is if you want to do business with them again. This point is very relevant for situations like force majeure.

The main problem for incomplete contracts becomes present in the force majeure clause. The foundation of incomplete contracts is that it is not possible to foresee every scenario of the future. It can be discussed if only the scenarios categorized as *unknown unknowns* types of black swans are valid for force majeure. Aven (2014) points out a new type of virus as an example of an unknown unknown. Nevertheless, as the definition of the black swans includes a *surprising extreme event*, it is probably more correct to include all three types as a force majeure situation (that is, the *unknown knows* and *extreme impacts* types of black swans too).

After explaining the force majeure situation, all contracts state that the NLM 10 is considered amended according to the extent required. As two of these contracts use Orgalim SE 01, this is unfortunate. This wrong spelling is a sloppy error that could perhaps give rise to unfortunate consequences. However, the intention of the sentence is clear.

The general conditions state different situations where Company has the right to an extension of the time for taking-over if a delay occurs. However, it is Company's obligation to notify the customer of any delays. In the absence of this notification, any additional costs to the customer, had he gotten the notice, is Company's liability. Therefore, the procurement contract with the shipyard should be clear regarding the notification from the shipyard to Company as well.

If Product is not delivered to the agreed time, Company risks having to pay liquidated damages to the customer. The liquidated damages are a percentage of 1% of the contract price for each commenced week of delay, but they are not to be exceeded over 10%. These percentages are from the NLM conditions. In the Orgalim conditions, the percentages are 0.5% and 7.5%, respectively. The possible costs are therefore greater with the NLM conditions. The following clause in the conditions is about what happens if it comes to maximum liquidated damages, and this is almost in compliance with both conditions except the total compensation. Before it comes to this Company will have only 10 weeks with the NLM conditions, compared to 15 weeks with the Orgalim conditions. If it does come to that point, the customer will have the right, with written notice to Company, to terminate the contract and be entitled to compensation for their loss based on this delay. The compensation in NLM is a maximum of 10%, and the compensation in Orgalim is a maximum of 7,5%.

On that account, the total percentage of the contract price is 20% with NLM and 15% with Orgalim. The conditions are stricter with NLM conditions (both versions), and Company risks higher costs with these conditions.

6. PAYMENT

The payment split used in the contracts is in accordance with Orgalim SE 01, Orgalim SI 14, and NLM 10. The payment split for the total contract price in the general conditions is different regarding whether the payment for installation of Product is based on a time basis or included in the lump sum contract price. The installation is included in all the analyzed sales contracts as a part of the lump sum price.

The payment split is 30/30/30/10 percentages of the contract price both in general conditions and in the contracts. However, Company has defined differently from the conditions when the different payments are due, and it seems that these are more precise and customized to Company. See Table 5.1 for comparison. The invoice mentioned in the table for the general conditions has a deadline of 30 days.

Table 5.1 Comparison of the payment split from Company's contracts and the general conditions.

Company	General conditions (Orgalim SE 01, Orgalim SI 14 and NLM 10)
First 30%	Advance payment due on the day of contract signing. The order will not be registered until this payment is made, and the contract can be recognized as invalid if the payment is not received within seven days of entering into the contract.
	Invoice with the formation of the contract.

Second 30%	Payment due eight weeks after contracting. ⁶	Invoice when Company notifies the customer that Product is ready for dispatch from the place of manufacture. ⁷
Third 30%	Payment due with the FAT at the shipyard. ⁸	Invoice when Product has arrived at the site.
Last 10%	Payment due after completed commissioning and CAT on the customer's location. ⁹ Or, at the latest, 30 days after Product leaves the shipyard.	Invoice on taking-over. ¹⁰

The first 30% will be due 30 days earlier with Company's payment terms as the invoice is due this day and not sent out this day. Regarding the second 30%, it is assumed that Product ready for dispatch comes after eight weeks, making this payment earlier for Company than with the general conditions too. Earlier payments are positive for the net present value (NPV) calculated for the projects, but this will not be discussed here.

The third payment of 30% in the sales contracts is due with the FAT at the shipyard. The general conditions state that this payment is invoiced when Product has arrived at the site. It is therefore assumed that the site is the shipyard and not the location of the customer. Defining the site as the location of the customer, 30% of the payment would come after the shipment instead. Having the payment before the shipment lowers the risk should any unfortunate scenarios happen during shipment that could be a liability to Company that is not covered in the contract due to incompleteness.

The final payment of 10% is due when whichever comes first: Completed commissioning and CAT on the customer's location, or at latest 30 days after Product leaves the shipyard. Regarding the last point, the reason is in cases of delayed commissioning for reasons beyond Company's control. As the contract does not specify that the CAT needs to be approved, it could be security for Company, but it could also be an area of ambiguity and discussion between the parties.

In the introduction for this section, it was mentioned that the analysis is done on the assumption that the CAT is the taking-over test from the general conditions. During conversations with Company, it seems like there are different views on what the site is and what taking-over refers to. It is clear in the contracts when the payments should be made, but it seems like there are some ambiguities in relation to the general conditions. On the other hand, the sales contracts do not need to be similar to the general

⁶ One of the contracts has changed to 12 weeks after negotiation with the customer.

⁷ NLM 10 includes that this must be In Writing as well.

⁸ It does not state whether or not this test needs to be approved.

⁹ Here too, it does not state whether or not this test needs to be approved.

¹⁰ See the paragraph on the takeover procedure below.

conditions, but when they are, it could be an idea to include relevant definitions in the sales contracts to make this clear. At least, have a common understanding within Company.

A known problem in the principal-agent theory is if the principal can observe the action of the agent. In the customer relation, Company will act as the agent, and the shipyard relation Company will act as the principal. Shavell (1979) also discusses how the arrangement of a fee should be paid from the principal to the agent, based on whether the principal can get correct information about the agent's effort. It is assumed that Company's customer does not directly observe Product production, only communication with Company. The FAT results (given by Company) would give the customer concrete information about the status of Product and would therefore give them a higher incentive to make the third payment. The FAT results are good both for the customer and Company (assuming the test is approved). The same goes for the fourth payment as well (with the CAT). The second payment is just based on a time interval.

Perhaps the content of one of these tests could be introduced to the customer during contract negotiations (perhaps include an appendix in the contract), so there are no, or fewer, ambiguities of what is expected of Product. The FAT is done in the shipyard (the customer can participate), and the CAT is done at the customer's location. Based on this, if there is no significant difference between the two tests, perhaps the CAT should be included as an appendix as this is the final test. It should be clear from the CAT what is to be measured and the result from this, so there is little room for subjective assessments. Adding the CAT as an appendix could also reduce the mentioned ambiguity around the completion of CAT in relation to the payment.

A new payment split is introduced in the NLM 19 conditions, giving the contractor a higher percentage sum for the first payment, 40%. The next payment is when Product arrives at the site and is set to 50%. The last payment of 10% happens at taking-over.

Only one of the contracts mentions the accrued interest in the event of late payment. This contract specifies that this is 1%. The conditions used for this contract were NLM 10, where it is not specified a specific percentage, but referring to the legislation in the company's country of interest on late payment.

7. TAKE-OVER PROCEDURE

This point includes both tests (FAT and CAT, that is, procedures both before and after the shipment), but with the trade term EXW, the taking-over happens before the Product shipment.

All the contracts include that Company shall notify the Customer of the FAT with an approximate 14 days' notice. It is not included in the contracts, but the conditions state that this needs to be in writing. However, the conditions have not included the length of the notice, just that it should be within sufficient time. Including the approximate 14 days' notice is great regarding the customer's awareness of when

to expect this notification but could perhaps give room for argumentation. Say that the notice was shorter than 14 days, and the customer would want to participate in the test but could not because of the shorter notice. Another scenario is if Company did not disclaim the responsibility for liquidated damages. This scenario could be unfortunate, but all the contracts include this.

Company can go through with the FAT should the customer not show up, and the customer must accept this. Company does neither have a responsibility to provide transportation for the customer to participate in the test.

According to the conditions, Company needs to remedy any deficiencies that come up during the FAT. Then, a new test needs to be in place unless the deficiency was insignificant. What is insignificant can be interpreted differently. However, if the deficiency was significant, this liability should most likely lay with the shipyard and not Company. This liability should therefore be included in the contract with the shipyard. That is if the deficiency is due to missing's in the construction. If the deficiency is due to wrongs in the construction design, based on Company documents, then it is conceivable that it would be Company's liability.

About the tests, the general conditions state that they shall be performed following the technical requirements specified in the contract. Suppose this is not present in the contracts. In that case, the tests shall be carried out following general practice in the appropriate branch of industry in either the site's country or the customer's country (depending on the type of conditions). The technical requirements are not included in the analyzed contracts. This country will likely be different from the Company's (international customers and if the site is defined as the shipyard), and the technical requirements should be included in the contracts.

If the payment is not fully done (100% paid), the general conditions state that Product is still the property of Company until paid for in full, including payment for the installation. Product is, therefore, still Company's property when it enters the location of the customer. It is not the customer's property until the CAT is completed and the last payment of 10% is paid. The Orgalim conditions also include that this shall not affect the passing of risk. In the case of Company, the property rights and passing of risk is not coincident as the last payment comes after the risk is gone over to the customer (EXW). Also, as the contracts states that the last payment can be due 30 days after Product has left the shipyard (if this comes before the commissioning and CAT), the property rights can be shifted to the customer before the commissioning and CAT is completed.

The customer is responsible for getting Company what it needs to complete the CAT, for example, fuel and materials. If the customer does not fulfill these obligations or in any other way prevent the CAT from being carried out, the test can be considered complete. This is, therefore, a liability that is with the customer.

It appears that the property rights here are residual control rights. These rights give the owner of a physical asset the right to decide what to do if a contingency is not dealt with in the contract. If it were a specific control right, it would have been included in the contract and assigned to one of the parties (Schmidt, 2017).

8. COMMUNICATION

This point is included in the contracts to facilitate better communication flow during the project. Company wants the customer to have direct contact with their project manager only, which will decrease the risk for any misunderstandings between Company and the customer. Good communication is crucial for a well-executed project. There is nothing directly in the general conditions regarding this.

9. NON-POSSESSORY PLEDGE

This point explains a non-possessory pledge (and refers to the current section in Norwegian Law) on the purchase sum, including interest and costs. The non-possessory pledge is a point included for security in case of missing payments from the customer. Company can require to take back Product to liquidate the missing payment.

As mentioned, the general conditions have a clause of property rights which states that Product shall be the property of Company until paid for in full by the customer. When the customer receives Product, 90% of the payment should be done, so in this case, it would be the last 10% that could be missing after hand-over.

10. VARIATION ORDER

Company desires the variation order requested by the customer as it gives them additional sales. The variation order is done through a form sent to the project manager. The contracts says that this needs to be in writing for both parties and should confirm all changes of specifications of Product, prices, and conditions. Change orders, or variation orders, are the usual way to change the initial contract that might need to modify the specification of the product (or service) in standard project management (Arve & Martimort, 2016). If there is any chance that there will be a delay from this VO, it is not stated what will happen. Any delays are probably something that goes under the condition part. However, if there is a high probability of delays following these VOs, it could perhaps be included more precisely. If there are any rules to what is allowed to change, that could perhaps be included.

It is interpreted that the general conditions refer to variations both based on regulations in laws and variations based on the customer's wishes. The contracts also mention that these variations are regarding all numbers and specifications of equipment and services.

A difference between the Orgalim conditions and NLM conditions regarding variations is that the Orgalim conditions include a clause about contract price limiting the liability for Company. This clause states that *“If taking-over is delayed as a result of disagreement between the parties on the consequences of variations, the Purchaser shall pay any part of the Contract Price which would have become due if taking-over had not been delayed.”* (Orgalim, 2014, p. 3).

11. DISPLAY FACILITIES AND ADVERTISING

This point is included to make sure that Company has the right to use Product made for the customer as an advertisement for other potential customers. They include showing the equipment on the location to the customer to new customers and the use of the customer’s name, photos, and videos of Product in other marketing activities.

The contracts state that this should be by further agreement from time to time and in agreement with the customer.

12. THE ENTIRE TENDER / CONTRACT

This point makes sure that all former agreements, oral, written, and other, will be replaced by this contract. Changes after this point will mainly go through VOs. If there are significant changes, there might be an amendment agreement or a supplementary agreement.

13. APPLICABLE LAW

Norwegian Law applies to the tender/contract.

14. TRANSFER NOT ALLOWED

This point states that the parties shall not transfer the tender/contract to a third party unless written and accepted by both parties. This order is also included in the general conditions. To not risk having unwanted third parties with sensitive information, this point is essential.

Company could perhaps also include that this applies to all information exchanged during the negotiations of the tender/contract (not just what is written on the document). However, the intention of this point is clear. In Norwegian Law, the interpretation of agreements is done based on a reasonable understanding of the agreement’s text, that is, the contract (“*talkning – jus*,” 2020).

15. COMPLAINT CONDITIONS

This point states that the complaint conditions are in accordance with the general conditions. Further, it states that this is provided that a technician authorized by Company does the commissioning. Having

authorized the technician is important to include as Company needs to have control over the areas that are their liability.

16. OTHER CONDITIONS

Under this point, Company disclaims its economic liability of any changes in locale regulations and government requirements after the contract signing. The general conditions also state that all the costs of variation work resulting from changes in laws, regulations, and rules (or the accepted interpretation of them) between the submission of the tender and the taking-over are the customer's liability, including other consequences. In the contracts, it states that this is after any contract signing. Here Company takes on greater risk as they exclude the tender process in their contract because the conditions in the contract are applicable above the general conditions. However, the contract is still not signed in the tender process.

Company has the responsibility of doing the variation work, but the financial liability is with the customer.

Company also highlights that there might be typos and arithmetic errors in the contract. As mentioned in the specification subchapter, there were some of these errors.

17. VALIDITY

This point states the length of the tender's validity. Further, it states that this is with reservation as specified in the other points above, which means all the conditions, including the extra conditions included by Company. The validity of the tender to the customer is based on the validity of the proposal from the shipyard to Company.

5.1.4.2 Other clauses in the general conditions that are not specified in the contracts

This paragraph will go through the general conditions to check for any particular risks and liabilities needed to be aware of for Company. It will not be as detailed as the former subchapter. The intention is to highlight other risks and liabilities. The general conditions are long and detailed documents, and this analysis, including the former subchapter, does not comment on every detail in every clause.

This section will only use the newest versions of the conditions, Orgalim SI 14 and NLM 19. By quickly examining the two Orgalim versions, it is clear that the headlines are the same. By doing the same with the two NLM versions, it is noticed that two new headlines have appeared: *Infringement of intellectual property rights* and *general limitation of liability*. The former was added in NL 17 to clearly define the supplier's liability for intellectual property defects, and corresponding rules were added to NLM 19. The latter's introduction is part of an adaptation to Orgalim SI 14 (DI, Danmark et al., 2019).

NLM includes some extra themes than Orgalim. These themes are *the contractor's liability for infringement of intangible assets* and *the buyer's right to the software included*. Company might have more liability regarding the intangible assets. The content regarding the software will give clearer use guidelines and is seen as positive to include in the contract. There are some additional conditions regarding the software that the contracts can refer to: The SW 14 (General Conditions for Computer Software, supplement to Orgalim S 2012 & Orgalim SI 14) (DI, Danmark et al., 2019). The content of the SW 14 conditions is not a part of this analysis. The contracts do not mention conditions about the software, just that there is a training of Company's software included in the contract.

The general conditions say that Company needs to give the customer any drawings showing how Product shall be installed. The drawings shall be provided in good time (NLM includes that this should be in an agreed time, and if there is no agreed time, it should be provided in good time). It is assumed that this includes the general arrangement drawing. No other drawings are presented in the contracts. NLM also includes that Company has the full liability for any costs related to wrongs in the drawings, descriptions, or information before take-over. Company is also liable for any damage to Product before the risk is passing to the customer with the take-over (except if the customer caused the damage). After take-over, the conditions for liabilities of defects clauses should be applied.

Company is liable for defects one year from the take-over date. The Orgalim clause adds that this is limited to 18 months if a delayed taking-over for reasons attributed to Company (except if a defect has been remedied in Product Company will be liable for the defects in the repaired or replaced parts for one year as well). This limit is not in NLM, but the NLM clause includes that if the customer uses Product more intensively than normal, this one-year period shall be reduced to a similar degree. The agreed operating conditions are also mentioned in another clause in NLM. The operating conditions are not included in the analyzed contracts and are therefore not agreed upon, as NLM mentions. Perhaps Company could include what they consider as normal hours of operations within a day, week, month or year, to make this clear.

The defects of Product Company is liable for are defects resulting from faulty design, materials, or workmanship. The NLM conditions add that this includes the damage on Product caused by this possible defect. If the customer has procured materials or specified designs, and defects arise from this, Company shall not be held liable. This paragraph regarding the defects is long, and there are several other details, but these will not be mentioned here.

The customer is responsible for the installation to be done safely and must give Company written information about which safety regulations are applicable. It is assumed that the focus is on Product specifications during the contract negotiations, but this could perhaps be included in the contract.

5.2 Interview findings

This subchapter presents a summary of the interviews. The summary will address main findings relative to this thesis and are divided into categories that were a foundation for the interviews and categories found based on interview transcriptions.

5.2.1 Challenges and ambiguities

The list below presents the challenges which emerged from the interviews, and the following text goes into details regarding these.

- Coordinated and updated Company documents
 - Product specifications
 - Building specifications
 - Drawings of Product
 - Contract templates
 - Other products that are a part of Product
- Product specifications from subcontractors (that will be a part of Product)
- Correct understanding of the customers' needs
- The contract text and details
- Certifications
- The first and last payment
- Covid-19

It appears from the interviewees that most of the challenge for the contracts generally, both the sales contract and the procurement contract, is to have the different documents coordinated and updated. These are documents regarding specifications of Product with Company (Product specifications), specifications of Product to the shipyard (building specifications), different kinds of drawings (for example, a GA drawing), and the contract templates. Company has various products that might be a part of Product that has its timeline. Products with other subcontractors than the shipyard also have their timeline. If all these documents are not coordinated, Company will have deviations that will most likely be their liability. It is also mentioned that there needs to be a structure to which references are made to which documents.

Besides keeping the documents structured, a challenge is understanding the customer's needs correctly and ensuring a common understanding of Product. Different stakeholders with different needs and goals with the customer (for example, an employee and the financial department) might present a difficulty.

Another point that is made is the contractual text. Company needs to be careful how things are written when they change something in the contracts. One of the project managers points out that there perhaps should be rules to when it is possible to make changes regarding the rules in the contracts. The contracts need to be clear, and a higher degree of details will make the contract better verifiable, both in the sales contract and the procurement contract. It is mentioned that the contracts in this industry may be a little short compared to other industries.

It is also mentioned that the certifications in the contracts must be clear and referred to. Company uses a Norwegian Standard for marine fish farms called NS 9415 that contains descriptions of demands for equipment components to Product. This standard is not required in other countries, but it seems like Company wants to deliver accordingly to other countries as well, as this is a good building practice and security. Some foreign customers also inquire about this and use this as it is a recommended certification. It is mentioned that the NS 9415 is a certification with high credibility in (at least) Europe. However, the certification can present some problems in countries that do not have clear rules associated with this.

Regarding the payment, Company must hedge the currency as they have foreign subcontractors. Company has payments to make to the shipyard and is therefore dependent on getting the payments from the customer. Company's payment to the shipyard is of a similar payment split as the customers have to Company. When the interviewees are presented with the question regarding the payments, it is mostly an agreement that this can somewhat be problematic considering foreign and unknown customers. Here it is vital to have a guarantee from the bank. However, one project manager says that the customer does mostly pay according to the contracts. The same project manager points out that there should be an agreement with the customer on how the payment should be made and that it is of Company's interest to communicate with the customers should there be a problem with the payment. It appears that the first and last payments are more difficult than the other two payments.

Company has also had a demanding period with Covid-19. They have several subcontractors where there suddenly are longer delivery times, making it more challenging to handle the administration work.

5.2.2 Risk allocation and analysis

When the interviewees are asked how they see the risk allocation between them, the customers, and the shipyard, it is emphasized that Company is the Product supplier. Therefore, most of the risk is with Company as the intermediate, as Figure 5.3 shows.

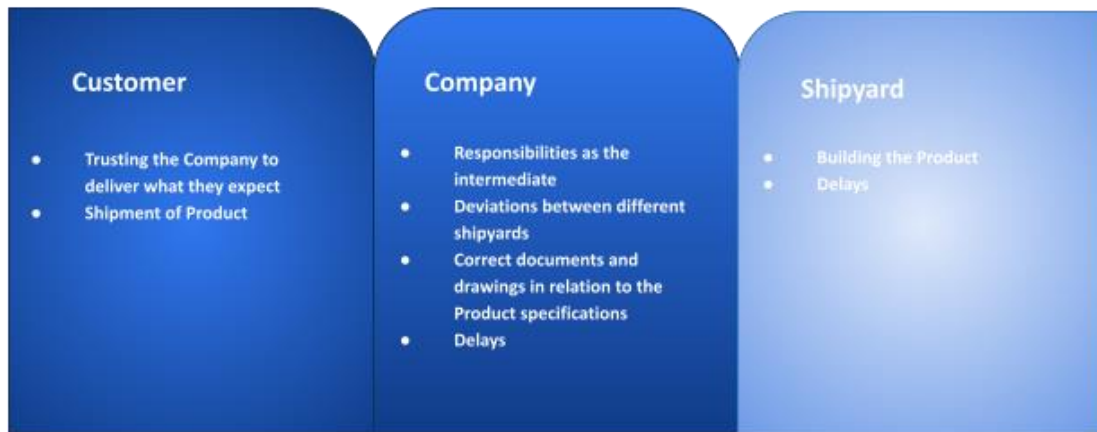


Figure 5.3 Risk allocation between customer, Company, and shipyard, based on the interviews.

There are definitions regarding risks in the procurement contract between Company and the shipyard. Still, one sales manager points out that, in the end, it is Company that will be held liable if there are delays because the customer has no contact with the shipyard.

However, one project manager says there is a risk between all three when presented with this question. This project manager's meaning of customer risk is that the customer trusts that Company will deliver according to what they expect. Company has several shipyards they use, and if the customer has bought a Product from them before and wants to buy a new Product, there is a risk that there might be deviations between these. The project manager points out that this is also a risk for Company they work with minimizing.

These deviations lead to the question about liability with the documentation. Both project managers point out the same here. Generally, the project managers have longer answers to the question regarding risk allocation. They have similar answers when asked about liability for correct specifications, shipyard delays, and Product shipment. The risk for Company regarding specifications of Product is to make sure that the documents and drawings of these specifications, presented to the shipyard, are correct. The shipyard has the liability of performing the work based on these documents.

This allocation is somewhat reflected in the responsibility for delays with the shipyard as well. Delays based on incorrect documentation or drawings from Company will be their liability, but otherwise, the liability will be with the shipyard. However, the origin of the delays can be complex, considering things like the Covid-19 pandemic and the blockage of the Suez channel. Therefore, the liability for the delay needs to be viewed from situation to situation.

Company usually uses the trade term EXW where the risk is with the customer during the shipment. Most contracts include that weather risk is with the customer. The customer organizes the shipment themselves, or Company can handle the shipment on their behalf. In the latter case, Company will use

a subcontractor for the shipment, and it is mentioned that the risk can somewhat be mitigated further to the subcontractor in this case (with a fixed price contract). The shipment can be included in the contract or be agreed upon later. The payment for the shipment can be a fixed price or a price plus demurrage. It appears that Company sometimes can take on the risk with the shipment, too, with some customers.

Regarding the risk analysis, Company has a risk register where they register risk and opportunities. In principle, the risk analysis should be done before the completion of a sale. There is a risk sum added to the project based on the analyzed risk. One project manager points out that there is risk-related work every day as a project manager.

Two of the interviewees, one from sales and one project manager, point out that there are variations when analyzing risk and based on the person’s subjective assessment. They are working with a risk matrix to define the risk so that the risk assessments will be more objective. With some rules and guidelines, the financial risk will probably be more accurate. One project manager also points out additional sales to the customer through variation orders and larger procurements to the shipyard as opportunities.

5.2.3 The tender process

Figure 5.4 gives an overview of the tender process based on the interviews.

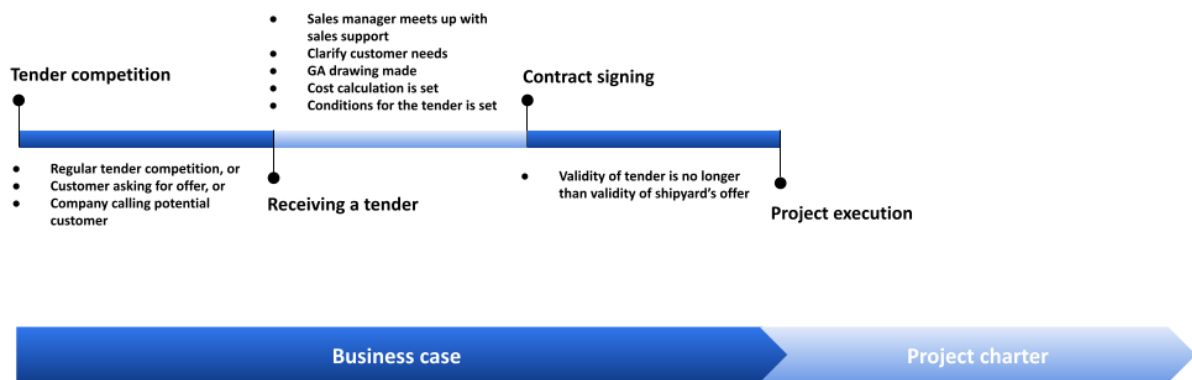


Figure 5.4 The tender process, based on the interviews.

Company participates in tender competitions, and one sales manager claims that they do win many of them. Besides the tender competitions, Company can get a call from a customer asking for an offer for Product, and Company can call a potential customer with an offer. Some customers have exact demands, but some can be very open and ask, “What do you recommend?” Some customers might be old customers and know more precisely what they want. It does not appear that Company has any concrete criteria or process when evaluating whom to send a tender to, other than not sending tenders to non-

professional players. The award criteria price will always be important, but if there is a good customer relation, there is a possibility of winning with a higher price.

When Company has received a tender, a sales manager goes to a sales support person in the department for Product, a technical expert in this department. After this, the sales manager might need to follow up with a customer meeting to clarify some things, depending on the clarity of their demand. Based on this, a GA drawing will be made and sent to the customer for approval, and there might be a new meeting where the technical expert participates. It appears that there can be a few meetings regarding clarification of the needs. Following a cost calculation will be set up where the technical expert inquiries about price from the shipyard and other sub-suppliers. Then, the sales manager, together with Company's sales director, sets a contribution margin and the conditions for the tender. The validity of Company's tender (to the customer) is no longer than the validity of the shipyard's tender (to Company).

When Company receives a tender, a business case will be made that is used until the tender is signed. After this, a project charter will be made that follows the project that the project manager uses.

Besides Product specifications in the tenders, there might be listed some options of other equipment or services the customer can choose. Sometimes the tender to the customer will be sent out quickly if the customer wants a quick offer or the sales manager wants the tender out quickly, which can give the tenders a longer list of options as there are most likely less clarified needs in advance. It is also pointed out by a sales manager that Company has had a tendency to include more equipment than needed, and that this makes their tender proposals more expensive. When this was realized, they tried to exclude some of this equipment and instead have it as an option.

During negotiations with the customer, there are some revisions of the tender, and it seems like this is very normal. The revisions are mainly based on changed or new needs from the customer. The customer might ask for things outside Product specification as well, and there can come revisions based on a not updated Product specification.

It is mentioned that the capacity in the tender process can be better. The sales managers and Company's technical managers have different views regarding their work tasks, and there must be a balance here. The capacity is mentioned regarding getting the tenders out quickly to the customers and updating the different documents. One of the project managers suggested that some engineering competence should be moved from the period after contract signing to the tender period. When they see the percentage of a possible sale rise to a high percentage, more resources should be taken into work with the tender.

It emerges from the interviewees that the communication with the customer is good, and any potential grey areas can be picked up during the project. One of the interviewees (a sales manager) says that the

project manager tries to have weekly updates with the customer. Most Products have a high degree of tailoring, and the higher this is, the higher the need for communication is. Different customers will have different needs. The interviewees make it clear that the customer is important and that it is essential to keep a good dialog with them. If a customer comes back to buy a new Product after good cooperation earlier, the same project manager might take on this project as he or she has a better understanding of the customers' needs.

It seems like there is good quality control in place before the tender is sent out to the customer and that different people control it over different levels of authority. The technical aspects, the costs and margins of the project, the payment terms, and the delivery terms shall be controlled.

5.2.4 After contract signing and project execution

Figure 5.5 gives an overview of the process after contract signing and project execution based on the interviews.



Figure 5.5 Project execution timeline, based on the interviews.

When both the sales and procurement contract is signed, there is a meeting between the sales manager and the chosen project manager to hand over the project. They also have a meeting with the customer to go through things. An interviewee refers to these meetings as kick-off meetings.

In the kick-off meeting with the customer and further in the project, the customer might want to make some changes to Product. These changes are handled in a variation order. The basis for a variation order can be different things. It can be that the customer simply wants to make some changes, a change in their needs. If the scope of Product is unresolved due to, for example, a higher degree of development, there will most likely be variation orders to clear this up. Company also has developments of other of their products that will be a part of Product, like software and hardware, and an upgrade here can also be a basis for a variation order.

If the variation is based on a wish from the customer, they will be sent an invoice for the extra cost, but if the variation is based on upgrades with Company products, the price change will cut the margin of the project.

There are two tests done on Product at the end of the project. These are called factory acceptance test (FAT) and customer acceptance test (CAT). The former test is done at the shipyard, and the last test is done at the customer's location.

The FAT is done to verify, validate and check that everything is in order, that is, to check that the shipyard has delivered according to the contract. The test is sort of a checklist, and if there are some deviations, this creates a punch list in which they have to "close" the different points. These deviations are reported in a quality assurance (QA) system with Company. It is desired to close as many of these points before Product is shipped to the customer.

The CAT is linked to the contract with the customer and is similar to FAT but with fewer details. The last payment shall be done in completion of this test, and it is desired that the customer approves the CAT at this point as this gives Company a verification that the customer is satisfied. It does not seem that the payment is a problem with minor deviations. With more significant deviations, Company appears to be flexible with the last payment as the customer is the most important stakeholder, and this relation is important.

All the interviewees give the impression that the communication between Company and the shipyard is good. The project manager has direct contact with the shipyard during project execution. Company also has a manager or team at the shipyard with a good dialog with the shipyard and gives daily feedback to the project manager in Norway. Every week there is a meeting with reports from the operations at the shipyard. The shipyard reports directly to the project manager and in that meeting, where Company's manager at the shipyard is present. Having a manager from Company at the shipyard will give them more control. These managers also have a quality assurance job at the shipyard. It is mentioned that these managers can have different titles, and two that are mentioned are site manager and technical manager.

When it comes to the communications between the sales managers and the project managers with Company, it seems like there is a clear distinction in their roles of responsibility. It is pointed out that this is really important as well, but one sales manager expresses that there have been some challenges as the two types of managers have different goals. Many sales managers and project managers are very skilled at understanding the whole process, but it seemed like it could be better. The same interviewee points out that the sales manager could also be more updated in how Product ended up at the end of the project. This way, the sales manager will be better equipped to understand the customer's needs should they come back.

5.2.5 Lessons learned

Company has had lessons learned, which they reported in a quality system mainly to the end of the project. It emerges from the interviewees that this is something that they need to do better. The lessons learned might have been done, but it have not been well implemented. Then again, as pointed out by one of the project managers, this quickly gets overlooked in most companies because of a busy schedule.

Company has recently implemented a new project model where the focus on lessons learned shall be greater, and it seems like it is already starting to have an increased focus. One project manager points out that many lessons learned are with the specific project manager, but it needs to be shared effectively and well.

5.2.6 Internal standardization project

Company currently has an internal project that is about standardizing Product. The goal is to have 80% of Product sales in a “repeater” and 20% as a “stanger.” With this measure, the bigger part will be Products with known specifications, and the lesser part will be custom Products. This way Company can become more efficient with both sales and procurement. It will be lower risk and a higher possibility to deliver on time.

This internal project is mentioned in several of the questions asked, so several of the matters the interviewees point out will become better. These matters are, among other things, a simplified tender process, defining risk in the risk matrix, clearer scope through Product specification and sales contract, better lessons learned process, and saved costs through larger orders to the shipyard. One project manager estimates that this internal project will be done early next year (2022).

6 Discussion

This chapter will discuss the results from chapter 5 and is structured in alignment with the subchapter interview findings (5.2). The discussion will be based on the interview findings and relevant results from the contract analysis (5.1).

6.1 Challenges and ambiguities

6.1.1 Documents important for the back-to-back concept

It appears from the interviews that there are ambiguities that can arise with the different documents. It also seemed like the interviewees had different relations to some of these documents (Product and building specifications), which one interviewee pointed out. It is understood that the building specifications to the shipyard are of greater details, and the sales contract includes (some of) Product specifications but has more content (compared to the procurement contract) regarding the extra work with commissioning, training, and service agreement. With this back-to-back relation, the sales and procurement contracts should be coincident, and the ambiguity could decrease with fewer dependent documents. Say, the product specifications and building specifications were to become the same document. However, as pointed out in the interviews, there are different timelines to consider which would lean towards keeping the documents separate.

So, perhaps one document could act as a base. If there is a standard template to the sales contracts, there could be open spaces to get the newest version of Product specifications to fill in. Depending on the system, the date could easily be checked, or there could be automatic updates. A change in Product specification would change the corresponding place in the sales contract or building specification. Regardless, any routines using old contracts as the base for making a new contract should be changed, as discussed in the analysis. If the last purchase was five years ago, there could be several changes to look over, and the chance for error increases. As pointed out by one of the interviewees, this industry is in constant change. Suppose the customer wants a similar Product as from five years ago. The standard template could be used and instead compare this with the old contract. Then a more standard process with the contract development would be in place as well.

However, it could be argued that the two specifications could be set together as one document without being concerned about confidentiality. This view is based on a comment from the interviews that Product specification is not a *direct* part of the sales contract. That the Product specifications are not a direct part of the contracts appears in the contract analysis as well, as the specifications are not very detailed.

With the back-to-back relation, it would be Company's risk if these documents are not coincident. It must be emphasized that these comments are made without any look at the documents.

6.1.2 Other documents and contract content

It is mentioned in the interviews and by Brynhildsvoll (2018) (regarding NLM) that the general conditions are supplier friendly as the supplier industry develops them. Other than this, the general conditions are not mentioned much during the interviews. The focus for the interviewees is on the specifications of Product. The contract analysis shows that the contracts are mostly following the general conditions but deviate in some areas. The deviation is not made clear in the contracts.

From the interviews, the GA drawing seems to be an essential document. As pointed out in the analysis, these are not always a part of the contracts (even when referred to). The general conditions state that any drawings should be given in sufficient time. What sufficient time is can be discussable, but introducing this to the negotiation stage with the customer could be helpful for a clearer understanding. On the other hand, it emerges from the interviews that the GA might be deliberately left out due to potential errors if several changes to Product have been made during negotiations.

There are perhaps some different views on the certifications in the contract. One interviewee points out that there have not been clearly pointed out earlier to what certifications have been used, while another interviewee says that these should be present in all contracts. It is understood that this should be the NS 9415, which is not present in any of the contracts that are the basis for the contract analysis.

Pointed out in the interviews is that they need to be careful with the wording in the contract and that there should be rules regarding who can change what. The wording in the contracts is pointed out in the contract analysis as well, together with the level of details. One of the interviewees mentions that there could be a greater level of detail in the contracts. Contracts are never too detailed or too long (Tirole, 2009). With a greater level of detail, any verification ex-post could be easier.

6.1.3 Customer understanding and relation

From both contract theory and interviews, it is clear that a correct understanding of the customers' needs is important but can be challenging. It is important to see what the need for the customer really is, even if they are not fully aware of it themselves (lay client). As pointed out in the contract analysis, it is noticed a difference in the customers' need for details, for example. From the interviews, it is mentioned that there are different stakeholders with the customer that have different needs and that it can be challenging to meet all different needs. Concerning the VO, it appears that what the customer wants might not always be the best solution, and because of that, not all VOs are approved.

A way to reduce the ex-ante asymmetrical information is to get to know the agent (Arrow, 1973). In this case, it would be for Company to get to know the customer as Product is developed for them (but it applies to both parties). However, it is assumed that there is no significant form of opportunistic behavior or adverse selection problem here as it is in both the customer and Company's interest that they have understood the other party. A point of view from the interviews is that the customer's risk is that Company delivers according to what they expect. Regarding any gap in expectations, a routine for demand verifications before the project start could be set to close this. However, it seems like Company has several meetings to clarify the needs of the customer. The suggestion from the contract analysis regarding adding the CAT as an appendix could be an option to help reduce the expectation gap.

The theory also points to the importance of good customer relationships in the awarding process for a smooth and short negotiation process. After contract signing, it is also important, considering the people working on the project are most likely not those who sent out and negotiated the offer. With Company, the project is handed over from the sales manager to the project manager.

It is assumed that there is a register over old projects, but if Company has many repeating customers, there could perhaps be a register over what that specific customer has ordered before. As there are variations throughout the project, the final Product could be registered through the lessons learned towards the project end. This register could also be a measure in understanding the customers' wants and needs. Also, if there have been price changes out of Company's control, this could help explain why the price has increased from any previous purchases.

As the contract should be back-to-back, it is good that the payment split with the shipyard is of the same set-up. In case of late payments from the customer, and if possible, payments to the shipyard could be set with a later due date to reduce risk. It is mentioned in the contract analysis that in case of situations that can be categorized as force majeure, the problem should be solved by contacting the other party instead of using legal clauses. The last payment of 10% seems to be an area for problem occurrence too. From the interviews, it is clear that Company wants to communicate with the customers to handle any problem with the payment. It is more important to keep a good relationship with the customer.

6.2 Risk allocation and analysis

6.2.1 Compensation format

In contract theory, the choice of compensation format is, among other things, based on who should have the risk of what. Company uses a fixed price contract, where the theory states that the company has all the risks. This risk allocation reappears in the interviews when they express that most of the risk lies with them. However, because they are not the sole supplier of this Product, as it is a back-to-back relation with the sales and procurement contracts, some risk is further mitigated in contracts with sub-

suppliers. This risk mitigation is also pointed out during the interviews and in the contract analysis, where the contract analysis comments on parts that are not Company's responsibility or have control over and that this risk should therefore not be with them. Cases like delays due to building the Product and shipment of Product should not be with Company.

It is discussed from the theory that risk can have both negative and positive outcomes. With the fixed price contract and the risk laying with Company, they will have risk in the form of, for example, both cost increases and savings. As they mitigate risk further to the shipyard, they will not bear the risk of building Product, that is, both cost increases and savings associated with this. The general conditions mention something about billing work that can be included in the contract regarding Product installation. Here, the risk will be with the customer in this case, but, as mentioned, Company has included this in the fixed price contracts.

In the case of incentive and cost-reimbursement contracts, there are greater transaction costs. Therefore, with a fixed price contract, they will thus avoid costs related to this. On the other hand, the estimation of the costs needs to be better in this case. The estimation will get better with the standardization of Product but is dependent on the shipyard. Cost estimations are fraught with uncertainty (Samset, 2014). Company should therefore be careful with setting the risk premium or contribution margin. It is good that this is set based on the different projects and not just added a standard percentage.

Fixed price contracts might be unsuitable when the quality is not verifiable (Albano et al., 2006). As discussed, the verifiability can be better with greater levels of details in the contracts. The specific content of the FAT and CAT is unknown, but it is assumed that this Product's quality can be verifiable, and there should be included checks regarding the quality.

6.2.2 Risk matrix

Company is using a risk matrix to help with the risk analysis. There is no mention of another risk analyzing tool (or method). As stated in theory, the risk matrix is not an analyzing method but helps describe the risk. One of the interviewees points out that the interpretation of risk with the risk matrix shall be better. Before, the risk was more or less set on a subjective judgment based on individual experience. The reason for this was the lack of a common risk definition for the evaluation, which is the case in the theory as well. It is less important how the risk is defined, as long as Company has consistency with its risk terminology (Aven, 2014). So, the employees should be on a common basis of interpreting the risk for different projects and pointing to the risk analysis limitations. However, Aven (2014) explains why this argumentation fails and points to the risk perception as this has a strong influence on how risk is analyzed. Company should therefore be aware of this.

The background knowledge the risk assessment is based on and the strength of this knowledge should be included in the risk matrix. If there are some acceptance criteria, or gates from the project model, incorporated in the matrix, a weak strength of knowledge can move the risk below the acceptance limit that normally would be accepted. Without a look at the risk matrices, there are a few points that can be considered with the improvement of the existing risk matrix:

- Include an opportunity matrix next to the risk matrix. The opportunity matrix could fit well with the *risk and opportunity* register with Company. This register also shows that Company is focusing on the opportunities too, as appeared from the interviews. One interviewee explains that sometimes they accept a low contribution margin because it lets them enter a desirable market. The two matrices can make this clear to the overall risk picture.
- Include acceptance criteria (perhaps as colors in the matrix). As the tender competition develops further, these criteria could perhaps change as well. The interview findings mentioned moving some engineering competence to the tender period associated with different percentages of a possible sale. There could be different criteria to these different percentages as well. If the competition has been going on for a while, many resources have been used, and the lust for winning the tender can be greater. At the same time, the information regarding the risk picture might have gotten better, and Company can be in a better position to make the correct choice.
- Have the risk evaluation by other people than the people working with the tender, as their incentives might be more toward getting the sale through. It does seem like several managers are looking at the tender in Company. With the quality assurance over several levels, as pointed out in the interview findings, there are several “background knowledge’s” looking at the tender, and hopefully the risks.
- Conduct training for the employees on the new evaluation in regards to the risk matrix.
- Check the categories in the risk matrix. As mentioned in theory, these can be misleading. It is typical to set low, medium, and high in the risk matrices. If this is set with a linear approach, risk or opportunity with 50% will be put on medium. As 50% means a chance of the event happening half the time, it can be argued that this is quite often and should be moved to high. At the same time, a percentage of 25% will be categorized as low, but a quarter is quite high as well and should perhaps be placed at medium. Company should assess this on their categories and could perhaps set more categories than just these three.

6.3 The tender process

Based on the theory, the tenders with Company are classified as tenders, not RFP. The reason for this is the comprehensive content in the RFP and when the tender is signed. The tender is accepted and referred to as a contract when signed by both parties, as stated in the sales contracts.

Capacity is mentioned as one of the challenges to the tender process. As there are opportunity costs to the used resources, this is something that needs to be considered carefully. With having different stages to when different resources are gathered, this could perhaps be managed better (the different percentages of possible sales, for example, 25%, 50%, 75%, and 95%). One must be aware of subjective assessment to classifying the possibility of a sale at a certain percentage.

It seems like the roles for the different managers are very clear, but not processes concerning the contracts. The process is perhaps based on different situations as well. It is emphasized that it has been very custom-made Products up until this point. Since the customer is the most important stakeholder, the processes are therefore adapted to the customer. More or less different processes related to different customers are seen as necessary, as Company should be adaptable in an industry that relies on customer relationships. It is probably more important to standardize the specifications of Product and routines and responsibilities with handling the different documents. Other areas that can be standardized outside the documents are the risk assessment and the lessons learned, as pointed out in the interviews.

As there are different methods to receiving and sending out tenders, it is even more essential to have coincident documents and standard templates for the sales contracts for this period. It appears from the interviews that there could be a more standard process to the tender period.

From the interviews, it seems like the quality control is quite good. There are some errors in the contracts, but these are not of great importance. With greater standardization with different documents, the quality control will be easier and quicker, as time is not done in analyzing different set-ups. So, both the time and the risk can be reduced.

6.4 After contract signing and project execution

6.4.1 Stakeholder relations

Company is in the private sector, and the relationship between the parties is therefore of greater importance, which is clear from the interviews. In the private sector, the prices can be set higher (does not have to follow as strict rules for tender competition as the public sector), which is also mentioned in the interviews. From the interviews, the comment on price is based on the importance of a trustworthy relationship.

A contractor can be distinguished between agent and vendor (Gardiner, 2005). Company can be categorized as an agent where they represent the customers' interests, and the shipyard can be categorized as a vendor where they deliver a product for a price.

In the contract analysis, it is mentioned that the procurement contract with the shipyard should be clear regarding the notification from the shipyard to Company. Company has a team at the shipyard, which

reduces the risk of getting late notifications. This team also reduces the chance of a moral hazard situation when Company (here: principal) can observe the actions of the shipyard (here: agent). From the theory, it is recommended to have a weekly status meeting when the development is done solely by the supplier. The interview findings mention a weekly meeting regarding the operations at the shipyard, in addition to daily feedback from Company's team.

6.4.2 Change management

From the theory, contract change management was named one of the most important areas to consider. The changes to Product are done with a variation order to the project manager. Wysocki (2019) refers to this as change requests and states that both parties must agree with the change, which is included in the contracts. The changes should be tracked with a description of the reason for the change. One interviewee points out that not all VO requests are approved and uses the example of a jacuzzi on the roof. The denied VO request might be linked to a *want* from the customer being greater than their *need*.

6.4.3 Acceptance testing

The acceptance testing when transitioning from vendor to client will be the FAT and CAT in this case. The FAT is the acceptance test between the shipyard and Company (where the customer can participate), and the CAT is the acceptance test between Company and the customer. This view on the tests is also pointed out during the interviews.

6.5 Lessons learned

Company is now in the process of implementing a better lessons learned process than what has previously been. The lessons learned towards the end of the project are usually neglected as time is limited, which is pointed out in the interviews as well. To ensure there is not too much work to the end of the project, small reports during project execution can be implemented. Well performance should also be remarked.

As mentioned, it appears from the interviews that the roles are clear, but, as pointed out by one of the interviewees, the sales managers should be better informed by how the sale went after the handover to the project managers. In cases of returning customers, the sales managers would be updated on how Product turned out for that customer and may be able to understand their need for the new Product. Thus, reducing ambiguity. This feedback is something that could be implemented as a part of the lessons learned; to update the sales managers that were involved. As there can be many changes to a project, it might be unnecessary to update every change because of limited capacity, and there can be changes to

that again. However, an overall update to the sales manager at the end of the project could perhaps be included.

6.6 Internal standardization project

Company is a company delivering technology solutions to the aquaculture industry, and there will always be some uncertainties when introducing new technologies in their new product development projects. However, Product of the contracts in this thesis is known. The goal is to standardize Product, thus reducing the uncertainty further. Therefore, it is reasonable to believe that the overall risk for these projects will be reduced with the internal project. With a greater standardized Product and procedures and less risk on the standard Product project, more resources can be shifted onto the new product development projects that are of greater complexity.

Standardization allows for products to be described precisely and unambiguously because of the low number of different models, and there is a low risk for incorrect and incomplete information processing (Dimitri, Dini, et al., 2006). Also, suppliers can exploit economies of scale in producing higher volumes (Dimitri, Dini, et al., 2006). Company might be able to order higher volumes from the shipyard and benefit from cost savings. It is thought that there naturally still will be some customization part to Product, but there could be orders for higher volumes for parts of Product. In these cases, Company must be careful with specific investments.

7 Conclusion

The problem statement in this thesis was to

identify risk allocation and ambiguities in sales contracts in an aquaculture company,

but the general remarks can be related to other companies with back-to-back contracts. Table 7.1 below gives a summary of the concluding remarks from the different sub-chapters in the discussion chapter.

Table 7.1 Concluding remarks from the discussion chapter.

Sub-chapter in the discussion chapter	Concluding remark
6.1 Challenges and ambiguities	Company would benefit by having more coincident documents because of the back-to-back relation to reduce uncertainty regarding deviation from the different documents. The general conditions the sales contracts refer to are supplier friendly. The content in the contracts deviates some from these. Understanding the customers' needs is challenging, but Company has a great focus on this, which reduces ambiguities.
6.2 Risk allocation and analysis	With a fixed price contract, most of the risk is with Company. Still, risk related to the shipyard's work, which the shipyard is responsible for, is mitigated further, allowing for sufficient risk allocation. Introducing a standard evaluation of risk will facilitate a better understanding and a more coincident risk analysis.
6.3 The tender process	A more standard process for handling the tenders should be in place, but still being adaptive to the different customers.
6.4 After contract signing and project execution	The relationship between Company and the customers is vital as Company represents the customers' interests. A better understanding of this at the start of the project can better processes around VO and acceptance testing.
6.5 Lessons learned	Like most companies, the lessons learned part of projects is lower prioritized, but Company will have a greater focus on this further. To increase the sales managers' understanding of the customers' needs after the handover of the project, the lessons learned could include feedback relating to this.
6.6 Internal standardization project	Standardizing Product will lower the risk to the projects.

The *risk allocation* seems to be well distributed between the customer, Company, and the shipyard regarding who can take responsibility for the matter at hand. In Company and customer relations, Company has mainly all the risks, but what Company is not in charge of is mitigated further to the subcontractors.

For making sure this is properly presented in the contracts, there needs to be little *ambiguity*. The contracts analysis shows some ambiguity in the sales contracts. The interview findings present ambiguity mainly as the compliance of specifications between the related documents (sales contract, Product specification, building specification, and the procurement contract). One way of ensuring low ambiguity is by figuring out the customers' needs during the tender process and have a common understanding of Product with the customer. As customer communication appear good, the focus should be on developing a better structure and standard process to have these needs presented and written correctly down into the tender. By ensuring correct needs and procedures to minimize the gap between the documents (either by good procedures or reducing uncertainty with a lower number of reliable documents), the procurement contracts with the shipyard can follow more easily. This is important as the procurement contract should coincide with the sales contract because of the back-to-back relation.

For a better report, the study should have increased the scope and included an analysis of the other related documents. The documents are especially Product specification, building specification, and the procurement contract and documents regarding the bidding, risk register, and lessons learned. The scope could also include a look at the revisions of the contracts and the changes made after contract signing to see if there are common ambiguities and uncertainties that emerge.

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Appendix A: Document to the interviewees

Some text is rewritten due to confidentiality to Company.

Interview information

The interview will be carried out as a part of the work on my master's thesis in the spring of 2021. The master's thesis will deal with the contracts for Product of Company. The basis of the thesis will be to analyze the content and design of some contracts for Product. The purpose of the interview is to support this analysis and in addition to map processes for handling these contracts. The thesis will be written without mentioning Company and names of the interview participants. Thoughts from the interviews will also not be listed as questions with direct answers, but more as a comprehensive summary from all completed interviews.

The interview will take place over Teams, considering Covid-19 and time constraints, and is estimated to take an hour. It is desirable to record the conversation so that I can focus on the interview and not on writing notes along the way. The interview will then be transcribed afterwards and deleted just as quickly. As far as possible, the transcript and deletion of the recording will happen the same day as the interview. The recording will be recorded by a MacBook (not mobile) and will therefore not leave the home. I fully understand that a recording can be uncomfortable, and if not desired the interview will of course be conducted without. I will not record the interview without an prior written consent.

The content of the interview is mainly about challenges and risks associated with the contracts, both with the customers and with the shipyard. In addition, there will be some questions regarding the handling before the contract is signed by the customer, and any lessons learned related to this. It is therefore desired that the interview goes most in depth on the first two, of a total of four, categories, which are presented below:

Challenges

Risk

The tender process

Lessons learned

At last, I just want to thank you for taking the time to participate for an interview. I really appreciate it!

Best regards,

Marie Bjørheim

Appendix B: Interview guide

Part I: Background

1. Position in Company?
2. How are you related to the work with the contracts?

Part II: Challenges with the contracts

3. What are the main challenges you see with Product contracts?
4. Typical ambiguities in the contract? Or disagreements between you and the customer?
5. Communication between sales and the project manager?
6. Communication with the shipyard?
7. What are the variation orders typically used for?
 - a. Changes based on uncertainty or indecisions?
 - b. How do you manage the price change?
 - c. Are there any rules for what is allowed to change, and what is not? Depends?
 - d. How is this regarding notifying the shipyard?
8. What is the background for the design of the contracts now? What do you think of the design of the contracts?
 - a. Specifications of Product
 - b. Options
 - c. Installation/commissioning/training/service agreement
 - d. Delivery terms (changes made from the standards?)
 - e. Missing content
9. Problems during and afterward as a result of an incomplete contract?
10. Have the customers done unexpected things which were hard to deal with in regards to the contract?
11. Problems with payments?
12. How is the contracts designed in regards to classifications and technical requirements?
13. How have you handled the Covid-19 situation?
14. Who has the ownership/residual control right of the asset after signing the contract?
15. Examples of specific/other challenges?

Part III: Risk allocation

16. How do you analyze risk for the bidding process and projects generally? Any tools, like risk matrix?
 - a. Do you have any risk register?
 - b. Do you have any risk margin when calculating costs?

17. How do you see the risk/liability distribution between the customer, Company and the shipyard?
 - a. Specifications of Product
 - b. Delays in production from the shipyard
 - c. Delivery of Product
18. Do you think it is clear for all parts what liability they have?
19. How are the contracts with the shipyard? Compared to the contracts with the customer?
 - a. Different shipyard with different procedures?
 - b. Notifications regarding delays?
20. How are the contracts with the customer about delivery? Do many choose to have you deliver, and not pick up themselves?
 - a. As the contracts state EXW, how is then the risk allocated?
 - b. Fixed price contracts here too?
21. How are the FAT/CAT checks? And what happens if there are any missing's/disagreements?
 - a. Any quality requirements?
 - b. What happens if some defects are detected during delivery?
 - c. What happens if there are any defects after an approved CAT?
22. Have there been any breach of contracts or terminations? Or any third party, like a court system, included?
23. Can you tell me about the currency risk?
24. How is the market for Product?
25. Examples of specific/other risk?

Part IV: The process before contract signing

26. Can you tell me about the part of the project model regarding quote and contract?
 - a. Are there any standardized processes to answer the quotes?
 - b. What are the typical demands from the customers about Product? Award criteria (price/quality)?
27. Can you tell me about how Company handles the tender competition?
 - a. How do you evaluate which proposal to send a tender to?
 - b. Do you have any type of quality assurance before sending off the tender?
 - c. Do you often win the tender competitions (%-estimate)? If not, why?
 - d. Do sales/marketing and project manager have the same type of documents?
 - e. Other approaches?
28. How is the process in negotiation about the tender/contract?
 - a. If the customer does not say specifically what type of equipment they want, do you have any standard types?

29. Are there many revisions of the tender/contract (%-estimate)?
 - a. What are the typical reasons?
 - b. Do you have any process for handling this?
30. How do you see the communication with the customer? Describe?
31. Are there unnecessary transaction costs related to the tender process? If yes, describe?
32. What separates Product and Product extra equipment in the contracts? Is this something that you want to highlight?
33. How is the time to delivery measured?
34. What do you think could be done better?

Part V: Lessons learned

35. Do you have any process for project evaluation?
 - a. If yes, how? Only at the close-out or during the project as well?
 - b. Are these well implemented internally/learned to further projects (not just identified)?
 - c. Who has this responsibility?
 - d. Examples regarding the tender competition?
 - e. Examples regarding the contracts?
36. Do the projects usually deliver on time? On budget?
 - a. What do you think characterized the project that was under and over time/budget?
37. What kind of feedback do you get from your customers?

Appendix C: Summary of contract analysis

Chapter and theme	Key points from the analysis	
An overall view and comparison of the contracts (5.1.2)	<i>The compensation format (5.1.2.1)</i>	<ul style="list-style-type: none"> • The compensations format is fixed price, which is suitable for this Product • Most of the risk is with Company
	<i>Changes and revisions (5.1.2.2)</i>	<ul style="list-style-type: none"> • Changes are presented with revision numbers and bold text in the contracts • Some text that is bold in all contracts can be mixed up with the changes with bold text • Appears that there are no formal process for handling changes
	<i>References (5.1.2.3)</i>	<ul style="list-style-type: none"> • References to information in the contract which is not attached • Reference to a customer's standard is not specified and therefore open to change • Referring to old deliveries without specifying what delivery
	<i>Copy-paste versus standard template (5.1.2.4)</i>	<ul style="list-style-type: none"> • Indications of copy-pasting from older contracts when making a new • The formulating of a new tender/contract should be based on a standard template • A standard template can make it easier to implement updates and upgrades from Product specifications and lessons learned
	<i>Wording (5.1.2.5)</i>	<ul style="list-style-type: none"> • Uncertainty around diffuse wording can make cases difficult to verify ex-post • If a matter is not settled it could be referred to a variation order for solving the matter

	<i>Risk allocation with the shipyard (5.1.2.6)</i>		<ul style="list-style-type: none"> • Risk related to the production of Product should be with the shipyard that is in control of this process • The risk allocation needs to be stated in the sales contract and the procurement contract
Product specifications (5.1.3)	<i>Specification responsibility (5.1.3.1)</i>		<ul style="list-style-type: none"> • The responsibility for correct documented specifications is thought to be with Company • It is important that the FAT is done carefully in regards to the installation, commissioning, and training for Product that comes after this test
	<i>Specification structure (5.1.3.2)</i>		<ul style="list-style-type: none"> • The specifications are structured differently in regards to quantity, information, grouping, and details
	<i>Options (5.1.3.3)</i>		<ul style="list-style-type: none"> • The contracts lists the options with little details • It is not clear whether the option is chosen • It is different information regarding the option when it comes to time (to decide) and the implementation
The general conditions (5.1.4)	<i>Clauses specified in the contracts (5.1.4.1)</i>	1. General conditions	<ul style="list-style-type: none"> • Refers to the type of general conditions applicable to that contract • The acronym for <i>supply and installation</i> is not stated • An older version of the general conditions is used • It is not clear where the conditions in the contract is different from the general conditions
		2. Currency risk	<ul style="list-style-type: none"> • Company secures the currency because of foreign subcontractors • The day for currency adjustment is not stated precisely in the contracts • Risks and opportunities related to the length of validity of the tender

	<ul style="list-style-type: none"> • The currency risk is a risk for the customer • Not stated in the general conditions
3. Delivery conditions	<ul style="list-style-type: none"> • The contracts use the trade term EXW making the risk for the shipment with the customer • Three out of four contracts specifies the shipyard • Important to state EXW as the default in the newest versions are FCA • Two of the contracts include the shipment, and this is done by a subcontractor
4. Shipment of Product	<ul style="list-style-type: none"> • The risk for shipment should not be Company's risk as this is not handled by them • The shipment of Product is either included in the contract, mention that it will be agreed upon in another document or listed as an option • Emphasized that the risk during shipment is with the customer
5. Delivery time	<ul style="list-style-type: none"> • The estimated time to delivery is set by the shipyard and the risk for delays should therefore be with them (when they are responsible) • The delivery date is specified differently (day, week, month) • The contracts emphasizes that the delivery time is only an estimate • Reduced risk regarding customer payment with the receipt of confirmation about an adequate financing • Could be unclear what the delivery time is with mentioning both the EXW (delivery at the shipyard) and the shipment of Product (to the customer's location) under this same point • All the contracts mention that Company is in a force majeure situation due to Covid-19 and these situations can be a basis for discretionary assessments

	<ul style="list-style-type: none"> • Writing error: NLM instead of Orgalim • The procurement contract should be clear regarding notifications to Company about delays • Higher percentage liquidated damages with late delivery with NLM conditions compared to Orgalim conditions
6. Payment	<ul style="list-style-type: none"> • The payment split is 30/30/30/10 percentages of contract price, and is in accordance with Orgalim SE 01, Orgalim SI 14 and NLM 10 • Company have different due dates than the general conditions • The last payment of 10% is when the CAT is completed, but the contracts does not state that it needs to be approved • Relevant definitions could be included in the contract when it is similar to the general conditions • The CAT could be included as an appendix in the contracts to strengthen the understanding of what is to be delivered • New payment split with NLM 19 • Only one of the contracts mentions the accrued interest in the event of late payment, set to 1%
7. Take-over procedure	<ul style="list-style-type: none"> • This point includes procedures both before and after take-over procedure (FAT and CAT) • The general conditions say that the customer must be given a notice of the FAT in a sufficient time and the contracts state that the notice shall be approximately 14 days in advance of the test

-
- Company can go through with the FAT should the customer not show up, and the customer must accept this
 - If deficiencies come up during the FAT that is due to construction the liability should be with the shipyard, but if the deficiency is due to wrongs in the design of the construction the liability should be with Company
 - The general conditions state that the tests shall be performed following the technical requirements specified in the contract or general practice in the appropriate branch of industry in either the site's country or the customer's country (the technical requirements is not stated in the analyzed contracts)
 - Company have the property rights of Product until full payment is done, even though the risk have passed to the customer with the completion of Product at the shipyard (EXW)
 - The customer have the responsibility of getting Company what is needed to complete the CAT

8. Communication

- The customer shall have direct contact with Company's project manager

9. Non-possessory
pledge

- Non-possessory pledge on the purchase sum, including interests and costs
 - The last payment of 10% is at most risk
-

10. Variation order	<ul style="list-style-type: none"> • Variation orders is done through a form sent to the project manager • The changes must be agreed in writing for both parties and confirm all changes of specifications, prices and conditions • Variations both based on regulations in laws and variations based on the customer's wishes • Orgalim conditions include a clause about contract price limiting the liability for Company
11. Display facilities and advertising	<ul style="list-style-type: none"> • Included in the contracts to make sure that Company can use Product as advertisement for other potential customers
12. The entire tender/contract	<ul style="list-style-type: none"> • All former agreements shall be replaced with the contract and potential new changes are handled with VOs
13. Applicable law	<ul style="list-style-type: none"> • Norwegian Law applies to the tender/contract
14. Transfer not allowed	<ul style="list-style-type: none"> • The tender/contract cannot be transferred to a third party, unless it is written accepted by both parties
15. Complaint conditions	<ul style="list-style-type: none"> • The complaint conditions is in accordance with the general conditions, provided that the commissioning is done by a technician authorized by Company

16. Other conditions	<ul style="list-style-type: none"> • Company disclaims economic liability of any changes in locale regulations and government requirements after contract signing • Takes into account that there might be typos and arithmetic errors in the contract
17. Validity	<ul style="list-style-type: none"> • States the length the tender is valid for
<p><i>Other clauses in the general conditions that are not specified in the contracts (5.1.4.2)</i></p>	<ul style="list-style-type: none"> • Two new headlines in the newest version of NLM: <i>Infringement of intellectual property rights</i> and <i>general limitation of liability</i> • There are some extra themes in NLM than in Orgalim which is <i>the contractors liability for infringement of intangible assets</i> and <i>the buyers right to software included</i>, but there is additional conditions to Orgalim regarding software (SW 14) • Company must provide the customer with drawing of Product in good time, like the GA, and (NLM states that) they have the liability of any wrongs in these • Company is liable for defect one year from the take-over date, with different conditions regarding NLM and Orgalim • The operating conditions is not stated in the contracts, but is something that the NLM mentions • Company is only liable for defects if the customer have not produced materials or specified designs • The customer is responsible for a safe installation