



Norwegian University of
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Overview & Analyses of Court Cases Related to Norwegian Underground Construction

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Abstract:

In public underground construction projects, there is a high conflict level between owner and contractor, and there have been several court cases over the past years. The thesis goal is to obtain an overview and analyze which disputes end in the court system. Furthermore, the thesis will identify underlying factor for these disputes, and propose mitigation measures to counteract these factors.

Literature review, document studies and interviews have been performed to obtain relevant data for the master's thesis. Four aspects were analyzed from the court cases; reason for litigation, court ruling per year, time spent in court, and cost and financial assessment of claims. Where these disputes originate, and factors contributing to the disputes, are discussed subsequently.

The thesis concludes that the underlying factors for these disputes are; the procurement strategy, optimistic bidding, inadequate scheduling work, communication problems, and personal issues in the organizations.

It is recommended to involve contractors early in the project and to implement conflict resolution technique during construction, to reduce the chance of court cases.

Keywords:

- | |
|--------------------------------------|
| 1. Underground construction |
| 2. Disputes |
| 3. Court cases |
| 4. Contributing factors for disputes |

Håvard Tveten

Preface

This master's thesis is written at the Norwegian University of Science and Technology (NTNU) as the final work on my 5-year master's program. The work has been conducted at the Department of Civil and Environmental Engineering, under Faculty of Engineering at NTNU, from January 2017 to June 2017.

The thesis is written in collaboration with NCC Construction AS, which provided valuable help in selecting topic and continuous support in the process.

The thesis topic of this master's thesis was selected after discussions with professors and my supervisor at NTNU, and after talking to representatives at NCC. All pointed to the high dispute level in the industry as an important subject to research, which resulted in the final topic selection.

The intention with the report is to show the dispute level in the industry and to identify reasons for the high dispute level.

A special thanks to my advisor at NTNU, Pål Drevland Jakobsen, for continuous support and feedback throughout the work on this master's thesis. He's guidance and feedback have been essential for the work.

Furthermore, I would like to thank Harald Inge Johnsen, Tedd Årnes and Anders Haukedalen for agreeing to the interviews, and by sharing their knowledge and opinions.

Finally, I would like to thank both Johan Martin Svensson and Marcus Olsson from NCC, which agreed to be my external supervisors.

Trondheim, June 2017

Håvard Tveten

Summary

There is a consensus in the civil construction industry that the dispute level is very high, and have increased significantly over the past years. Claims are totaling hundreds of millions of kroner. This study looks at disputes in the Norwegian underground construction industry ending in the court system, and comprises disputes between public owners and the largest contractors in the country over the past ten years.

The main objectives of the master's thesis are to collect information on disputes ending in the court system. Court documents are studied to identify the types of disputes most likely to end in court, and identify underlying factors for why these disputes remain unresolved through the projects. Additionally, the goal of the study is to propose mitigation measures to reduce the number of court cases.

A literature review was performed to find former studies on the subject, and determining the industries standing and views on the problem. The main body of the study encompasses document studies and interviews. The aim from the document study is to collect information on court rulings, in order to determine litigation cause, duration and to perform a financial assessment. The interviews focus on identifying the underlying factors for these disputes.

The results show that disputes ending in the court system originates from ambiguities and mistakes in tender and contract documents, and from disagreement over progress disturbances not solved during construction, ending in large and complicated claims in the final account. On average, these cases take between 1 to 2,5 years to conclude. The thesis concludes that the underlying factors for these disputes are; the procurement strategy, optimistic bidding, inadequate scheduling work, communication problems, and personal issues.

The recommended measures to reduce the number of litigation in the industry is to facilitate for earlier involvement of the contractors in large and complicated projects. Furthermore, it is recommended using conflict resolution concepts during construction, to solve disputes early.

Sammendrag

Det er enighet innad i bransjen at konfliktnivået tilknyttet infrastrukturprosjekter er veldig høyt, og at nivået har steget betydelig de siste årene. Det krangles om beløp i hundre-millioners klassen. Oppgaven ser på konflikter i norske underjords-prosjekter som ender i rettssystemet, og omfatter tvister mellom offentlig byggherre og de største entreprenørene for de siste ti årene.

Hovedformålet med denne masteroppgaven er å samle informasjon om tvister som ender i rettssystemet, og analysere resultatene. Rettsdokumenter er studert for å identifisere hvilke tvister som ender i rettssystemet, og for å identifisere underliggende årsaker for hvorfor de ikke er løst på et tidligere stadium. I tillegg er målet med oppgave å identifisere tiltak for å redusere antall tvister som ender i rettssystemet.

En litteraturstudie er gjennomført for å dokumentere annen forskning på området, og fastsette bransjens synspunkter på problemstillingen. Hoveddelen av oppgaven omfatter dokumentstudiet og intervjuer. Formålet med dokumentstudiet er å samle inn relevante rettsdokumenter, for å bestemme rettsakens årsak, varighet, og for å gjennomføre en økonomisk vurdering. Intervjuenes hovedfokus er å identifisere underliggende årsaker for disse tvistene.

Resultatene viser at tvister som ender i rettssystemet har sin opprinnelse i tvetydigheter eller feil i kontrakts-grunnlaget, eller uenigheter over fremdriften med resulterende plunder og heft, som ikke blir løst i gjennomføringsfasen. Disse ender i store og kompliserte krav i sluttoppgjøret. Sakene tar gjennomsnittlig 1 til 2,5 år å løse i rettssystemet. Oppgaven konkluderer med at kontraheringsmetode, optimistiske anbud, utilstrekkelig planlegging, dårlig kommunikasjon, og personlige problemer er underliggende årsaker til disse tvistene.

Det blir anbefalt å tilrettelegge for tidligere involvering av entreprenørene i kompliserte prosjekter for å redusere sannsynligheten for at uenigheter ender i retten. I tillegg er det anbefalt å ta i bruk et kontinuerlig tvisteløsningsorgan for store og kompliserte prosjekter, for å løse tvister på et tidlig stadium.

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1 Introduction

1.1 Background

In the last couple of years, there has been an increasing number of underground projects in Norway, as shown in the Norwegian Tunneling Society’s statistic in figure 1. The vast majority of underground projects are for road tunnels, followed by hydroelectric power and railroad. An increasing urban growth requires higher capacity roads, and there is also an aim to reduce air and noise pollution in the cities. Combine this with restricted space on the surface and a political desire to facilitate for pedestrians, more and more civil infrastructure is placed underground. These demands are expected to increase in the future.

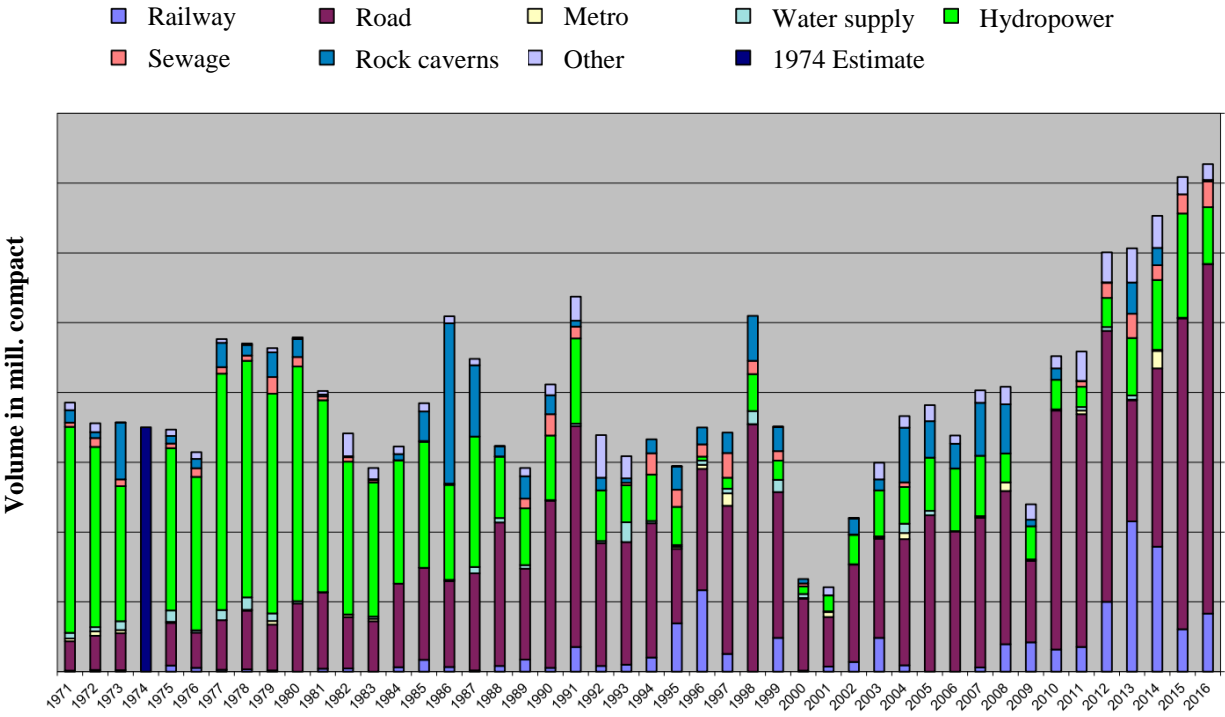


Figure 1: Annual excavated volumes from tunnels and rock caverns, 1971 – 2016 (NFF, 2016).

As shown in figure 1, most of the underground excavation is due to construction of rail, road and hydroelectric power. The government department with overall responsibility for these projects is The Ministry of Transportation and Communication. This department have a number of subsidiary companies, which specialize in the different areas. Two of the subsidiaries are Bane NOR (Railway infrastructure, formerly known as Jernbaneverket) and Statens vegvesen (Public Road Admini-

stration). These companies will act as owners for all public rail and road construction projects in Norway.

99% of all electrical production in Norway is produced as hydroelectric power (Statkraft, 2017). As a result, hydroelectric construction in Norway has been extensive. Statkraft AS is an international energy company fully owned by the Norwegian government. They are usually responsible for all hydroelectric construction projects in Norway, and owns and operates roughly 40% of Norway's electrical capacity.

The majority of underground excavation is done with the traditional drill and blast method, but the use of TBM is increasing. In figure 1 you can also see that 2016 was a new record year in underground space excavation. The new record was at 7.271 million cubic meters of rock mass, an increase of roughly 200.000 cubic meters. This was accomplished by a record amount of construction companies, a total of 21 contractors. (Homleid, 2016). Fourteen of these contractors are considered as Norwegian companies, and the remaining seven are inter-national contractors.

In addition to an increasing number of underground projects, there have been an increase in the number of conflicts and disputes in the Norwegian public infrastructure projects. There is a consensus in the industry that the conflict level is too high, and that construction to some extent is characterized by conflicts. It is not uncommon for disputes totaling hundreds of millions of kroner.

Disputes not solved can be taken to court to reach a final ruling. This is both time and resource consuming for both parties. Larger cases will normally require more resources, and these will naturally be taken out of potential production. Furthermore, companies often use highly qualified and experienced people to work on the cases. This leads to lost productivity and high cost, and is a losing situation for both parties.

Research has shown that the potential for a beneficial agreement for both parties decreases as a result of increased use of resources, and involving more people can in some cases escalate the conflict (Lædre, 2009). Unresolved conflicts will often tend to the use of legislations, which in turn require the involvement of a third party, e.g. law firm. The same research shows that it is difficult to predict the outcome of potential court cases with high involvement of third parties, and that it is more challenging to arrive at an agreement both parties will accept.

As a result of the increased dispute levels in the industry, construction management can expect to spend significant time and effort working on settling construction disputes. This time would be better spent focusing on construction.

There has been limited research on the field, and most of the studies comes from the United States. They operate with other construction strategies and have other attitudes in the industry, so the research might not be applicable to the Norwegian industry.

1.2 Main Objectives of the Thesis

The overall objective of this master's thesis is to establish an overview of the conflict level in the Norwegian underground construction industry. Disputes will be resolved at different stages of the project, and the most complicated disputes are prone to end up in the court system. This thesis will analyze these disputes, and to accomplish this, the following research objectives are proposed:

- Collect information on disputes ending in a court ruling for recently completed Norwegian underground projects. Collect data by document studies, interviews and former research on disputes between public owner and contractor.
- Identify what types of disputes ends in the court system, and identify underlying factors and causes for this.
- Identify and suggest mitigation measures to limit the above mentioned factors and causes.

1.3 Scope & Limitations

This thesis focus on court cases concerning public underground infrastructure projects in hard rock. Any other civil construction projects or disputes solved prior to a litigation are beyond the scope of this study. Projects using either Drill and Blast (D&B) and Tunnel Boring Machines (TBM) are included, but the latter has rarely been used. Work related to these methods, as cuts and earthwork for “cut and cover” are also included in this study.

The main limitations for the thesis will be as follows:

1. Projects with public owners. In the case of this study, this will include Bane NOR (Railway Infrastructure Company), Statens vegvesen (The Public Road Administration) and Statkraft. The first two are subsidiary organizations of The Ministry of Transportation and Communication (Samferdselsdepartementet), and are usually responsible for planning and controlling work performed by contractors, and operation of public infrastructure.
2. The thesis is going to focus on the top tunneling contractors as of 2016 (Homleid, 2016), measured in excavated rock mass. These are Veidekke ASA, Implenia Norge, Skanska Norge AS, AF Gruppen ASA, NCC Construction AS, Leonhard

Nilsen & Sønner (LNS), Kruse Smith, Marti AS, OBRAS Subterraneas S.A (OSSA), Mika AS, and Hæhre Entreprenør AS. In addition, the state owned company Mesta is included, as this contractor have both most contracts and most disputes with the public owners in the country (Norli, 2014).

3. The thesis will focus on conflicts between a public owner and contractor. Disputes between contractors and sub-contractors are smaller in scale and are less likely to end in the court system, and will not be considered in this thesis.
4. The thesis is limited to projects in hard rock. There has only been one soil tunnel over the past few years, which was a success regarding time and budget, and with no disputes (Aagaard et al., 2016).
5. Court cases studied in this thesis is limited to 10 years. This is done to limit the search, and since it's been a rapid increase of underground projects in these years. It is also reported that the dispute level increased during this period.

1.4 Structure of the Thesis

This thesis assumes a base knowledge of the construction industry, and are aimed at industry professionals. Construction terms are assumed known. The legislative system will be thoroughly presented, with special terms presented in the text.

A detailed theoretical background for the thesis is presented. This include detailed descriptions of dispute resolution systems in Norway, including mediation, arbitration, and the court system. Furthermore, the theory of the unit price contract, which is the most used contract in tunneling, are described in detail.

Further in the thesis, a thorough presentation of the research methodology is presented. The major approaches used are literature review, document studies of court cases, and interviews with industry professional.

The results from the study is presented, with an emphasis on the results from the document study. This section will also include analyzes of what the results imply.

The main findings are discussed and put into a broader picture in the discussion chapter. This chapter identifies and discuss the underlying factors and causes for disputes ending in the court system. Possible mitigation measures are also discussed here.

A final conclusion summarizing the findings are presented at the end. Recommendations and further work required are presented here.

2 Theoretical Framework

2.1 Dispute Resolution

Disputes in a project occurs when contractors and owners are unable to reach an agreement. Conflict can arise for a number of reasons; including disagreement on risk allocation between involved parties, people issues, process difficulties and more. Disputes will in most cases act negatively on the project, and unsolved disputes might escalate if not handled at an early stage. Research has shown that disputes are most cost-effectively resolved at an early stage, favorably at the project level (Construction Industry Institute, 1995). Therefore, it is favorably to solve the dispute at an early stage, and as shown in figure 2, there are several “steps” of escalation before reaching litigation. The different conflict resolution technique is not a set of successive hierarchical steps, but techniques that can be instigated by the involved parties. The figure illustrates how each technique is associated with increased hostility, cost and time to resolve the dispute.

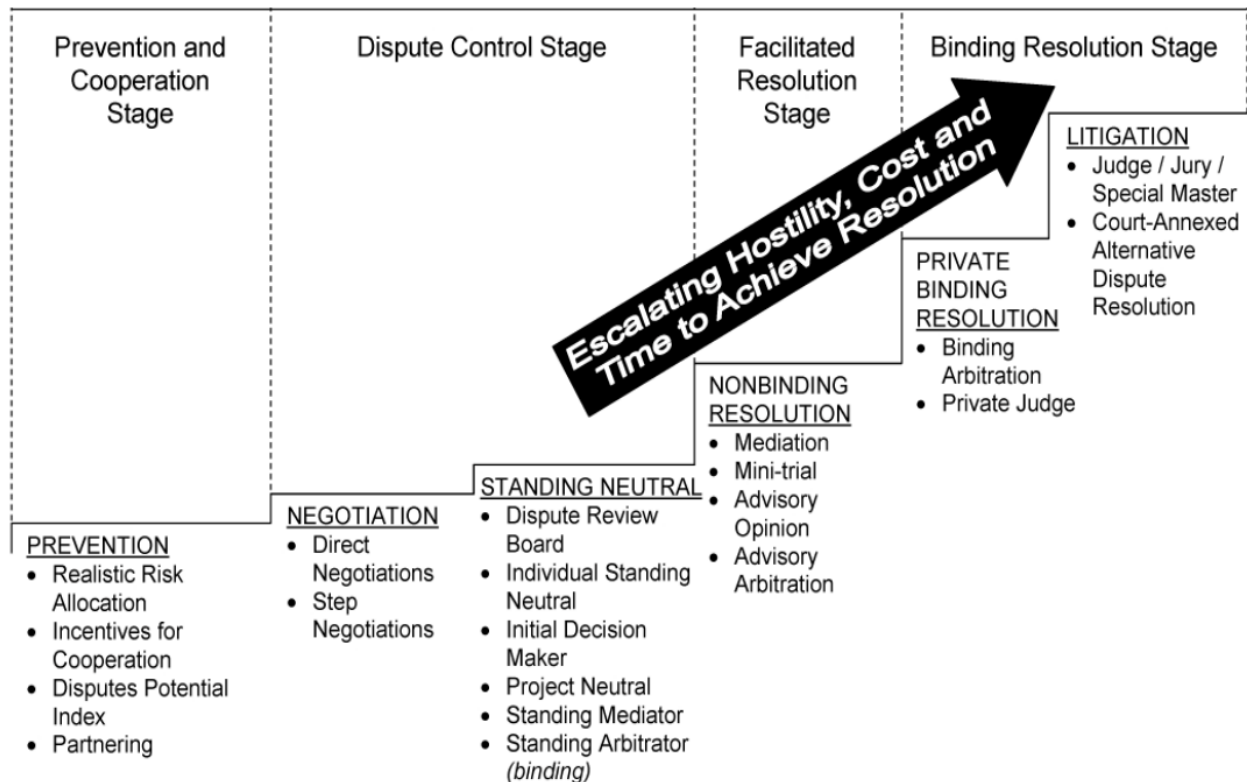


Figure 2: Dispute resolutions stages (Hafer, 2010).

Negotiation between the parties are the first step to resolve disputes. This include both direct negotiation between field managers working on the project, or between superior leaders in the

companies. Unresolved disputes will in some cases be passed on to successively higher management levels. This requires no external participation, but have the possible downside that they might not be as well acquainted with the project as the field managers.

A common dispute resolution technique in the US, which is also starting to get a hold in Norway, is to use include a standing neutral in the projects. This process involves a neutral person or group to act as a dispute-resolver in the project. The people involved are qualified and experienced people from the industry. All involved parties normally nominate one person that the other party can approve, with a third person nominated together (Lædre, 2009). The goal is to get a third party with unbiased views and not affected by personal issues, to assist on resolving conflicts as they arise.

Including a third party in the negotiations can help to put new light on the issue, and visualize the party's goals and needs. The final decision can on the other hand be made by a third party which does not have the same understanding of the dispute as the involved parties, ending with a resolution that do not cover the needs or view of either side.

If disputes are not resolved by this stage, a legislative third party will usually be involved. This can, as stated above, escalate the conflict and requires more resources. The complexity of these situations generally require either internal or external experts to help in the case.

When the disputes involve a legislative third party, there are normally three ways to reach a solution:

- Mediation
- Court system
- Arbitration

2.1.1 Mediation

Mediation involves a third party to aid in the negotiations. Mediation is not bound by the same rules as the court system or arbitration, and mediators are not legally able to enforce a binding solution to the parties. Mediation is a flexible approach to find a settlement. The parties are not bound by the mediation, and they can break the negotiations at any time. The aim is to reach a settlement outside of a legislative framework, saving significant time and money for all parties.

For large civil infrastructure projects, the most common approach in Norway is to mediate with lawyers. Mediation can end in either a settlement outside the court, settlement in the court, or no resolution. The last instance leads to a court case. The difference between the first two depends on if the mediation was commanded by the court, and thus has a court appointed mediator.

A settlement reached outside of the courts will have the same legal effects as a regular agreement. A court settlement will have the same legal effect as a court ruling, and can only be changed if the case is resumed.

It is advantageous to solve disputes by mediation opposed to going to court. According to the law of civil disputes (Tvisteloven) §14-3 and §14-4, cases that can disclose company secrets or have other restrictions will be classified. As a consequence, most settlements will be confidential.

Reaching a settlement can also save significant time, and is preferred by all parties. It can on the other hand be a demanding process, involving several lawyers and a lot of documentation, but compared to a court case, it is a fast process. Settlement will be further discussed in chapter 5.2.

2.1.2 The Court System

If a solution to a dispute is not reached, it will as a general rule be taken to the court system. The Norwegian court system consists of three instances; the District Court, Court of Appeal and the Supreme Court. Norway is divided into judicial districts, which handles disputes based on where they originate. The structure of the courts is hierarchical, with the Supreme Court at the apex. According to The Courts of Norway's home page "*the function of the court is to settle civil disputes brought to court and to be responsible for a society's right to respond to and punish whomever breaks Norwegian Law.*" (The Courts of Norway, 2015).

According to the law of public transparency (Offentlighetslova), any case run in the court and documentation related to the proceedings are in most occasions open to the public. There are some exceptions which rarely affect civil disputes, and will not be described here.

Civil construction projects follow rules for civil lawsuits, and is regulated through the law of civil disputes. The Norwegian Law presupposes that every civil case is tried solved by a Conciliation Board consisting of lay judges, to relieve the court system. There are exceptions to this, and both the state and municipalities are exempt this rule. It is rarely used for construction projects since the disputes are too complex. As the head of the legal department in the Public Road Administration, Anton Ths Lein stated in an email (Lein, 2017), neither the state or the judges see the board as a suitable platform to solve the disputes. These cases are therefore always taken directly to the District Court.

The district court is the lowest of the three instances, and is where the disputes are heard first. They handle both civil (Those who are not solved in the Conciliation Board) and criminal cases, as well as special cases like bankruptcy, debt settlement, cases on enforcement and more. There is a total of 64 district court, in 63 different districts. Two district courts are located in Oslo, where one court handles civil and criminal cases, and the other the special cases.

A court ruling from the District Court can be appealed to the Court of Appeal. An appeal can be made if it is regarding sentencing, the proceedings or law interpretation; but can also be refused if it is clear that the appeal will not be successful. There is a total of six Courts of Appel in Norway, covering six circuits (geographical areas). For an appeal to be heard at a higher instance, it will always have to go through a screening committee of three appellate judges, and in some cases additional lay judges.

The Supreme Court is the highest instance in Norway, and is the final instance. This court handles cases where the law is unclear, and is also responsible for the evolution of the law. All decisions made here are final and cannot be appealed further. An appeal to the Supreme Court is difficult to get heard, and will have to go through an appeals committee of three judges. All proceedings are in writing alone, and will only be accepted if the appeal concern issues which significantly extends outside of the law, or for other reasons will have to be solved by the Supreme court. As a consequence, few construction disputes end up here.

2.1.3 Arbitration

As a general rule, litigations are handled by the court system. This can be avoided by incorporating a clause on arbitration in the contract. This is increasingly used in larger construction projects, and can be included in the standard contracts.

Arbitration are a private alternative to the courts. All proceedings follow the same processes as the court, and the rulings have the same juridical validity as a ruling from the court. Arbitration is on the other hand not bound by the same rules as the court, and differ from the courts at two main aspects. Firstly, any ruling in the arbitral court cannot be appealed, so all rulings are final. This can lead to a faster resolution, in contrast to a worst case scenario, where a case is tried in all three court instances. The downside is that the parties are stuck with the outcome. Secondly, the parties are able to select their own judge. This can be advantageous, as construction disputes can be very complicated, and the chosen arbitrators usually have background from the industry. This increases the chance of covering the needs of all involved, and ending on a correct ruling.

Since arbitration is a private alternative, the involved parties are able to create their own agreements. This mean that the proceedings can be exempt the law of public transparency, and it

can remain confidential. There are few benefits from exposing sensitive information, and the proceedings usually stay confidential.

The downside of arbitration is that the proceedings can be prolonged. Since there is no option to appeal, each party is more likely to exhaust all arguments in their favor. This can be time consuming, and can prevent a fast resolution.

The use of a private court is also a much more expensive solution than the regular courts. Expert judges are usually much more expensive, and the possibility of a longer proceeding can increase the cost significantly.

2.2 Contract in Underground Construction

Norway is closely connected to the European Union through the European Economic Area (EEA), but not as a part of the EU. The agreement connects Norway to the internal market and the basic rules as for the EU, but excludes some other policies. The close ties to the EU and regulations through the EEA, entails that Norway generally adopts the Euro Codes (The Norwegian Mission to the EU, 2016). For public construction projects, most laws regarding contracts, tendering, procedures and non-discrimination are the same as those in the EU (Ravlo, 2012).

The general philosophy in Norwegian tunneling practice has always been to include the rock mass as a part of the construction material, and utilize the natural capabilities and strength. Further strengthening is determined studying the actual rock quality met at the rock face. In general, underground projects will always carry a high risk and uncertainty, mainly regards ground conditions and construction time, and this leads to several issues that needs to be handled in the contract:

1. How to evenly and fairly share the risk between the owner and the contractor.
2. Secure a safe and healthy construction site.
3. Secure a flexible contract to meet possible unexpected ground conditions.
4. How to the owner and contractor interact to achieve the desired results.

The Norwegian practice to solve these issues are to use a unit price contract. This type of contract is suitable to handle changes of scope and to share risk. In a unit price contract, the final cost of the project is calculated based on actual quantities used in a project, and the predetermined prices for different items (Lædre, 2014). The contract addresses two main element of risk; ground conditions and construction time (Grøtv, 2012).

- Ground conditions. The owner is responsible for everything associated with the ground conditions. He is responsible to acquire land and perform sufficient ground investigations, and will therefore be responsible for all deviations from this. This usually imply changes to rock support and grouting. Both the owner and contractor will have personnel inspecting the face and other ground investigations, to agree on the type and quantity of rock support needed. The owner will therefore bear the cost of worse than expected ground conditions.
- The contractor is responsible for the performance and execution of the work, and to build according to technical specifications. The contractor will be reimbursed for actually performed work according to unit prices set in the contract, and construction time is based on standard capacities for different activities. The contractor takes the risk to execute the work at a normal speed, and takes the cost if the work is not efficient.

In underground project, most risk is on the owner in a unit price contract. Since it is the owner that chose the location and placement of the site, and is responsible for the risk at the chosen site. Figure 3 illustrates typical risk allocation in the contract type for underground construction, and the projected cost of different contract types. The project coast is based on average results from several projects.

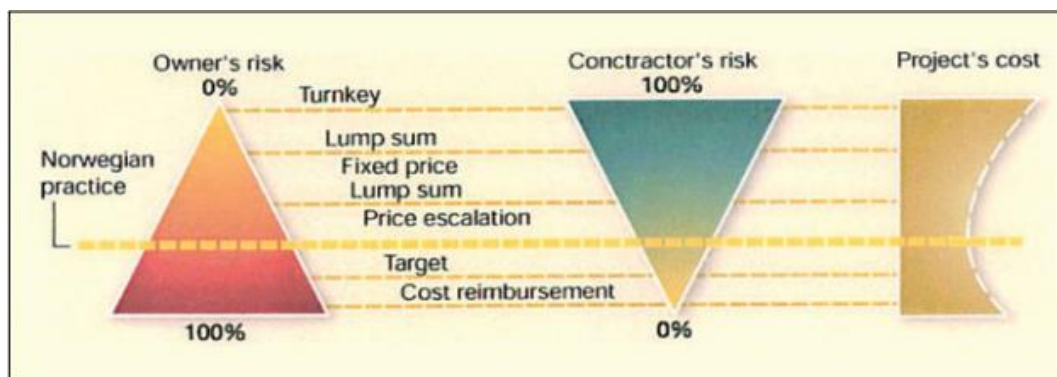


Figure 3: Risk allocation principle and assumed influence on project cost (Grøvn, 2012).

Unit price contracts

Following is a description of the typical unit price contract used in Norwegian underground projects. The tender offer is based on the following information given by the owner, and the normal procurement strategy is to select a contractor based on lowest bid:

- Geological and/or geotechnical reports. As mentioned above, the geotechnical and geological aspects is at the owner's risk. The report is based on geological site investigation, and should contain all available data. Additionally, the report usually contains the owner's interpretation of the data. The tenderers bid shall always include the contractor's interpretation.
- Bill of Quantity (BoQ). This is an extensive list of all activities to be performed in the project, and is developed by the owner or a consultant. This document is used by the contractors to price the work they are bidding.
- Variations of quantities. Actual quantities needed can vary from what is described in the BoQ. The unit price set by the contractor will remain fixed as long as the quantities are within the variation set in the contract. Some set this as high as +/- 100%.
- Standard capacities. This is the progress the contractors are expected to hold. It is usually set by average and standard time from earlier underground projects. It is traditionally negotiated between contractor and owner organizations, and is updated and adjusted frequently to keep up with technological development.

This contract system have worked very well in Norway the past 50 years, and is the dominating contract in the underground construction industry (Grøv, 2012). The unit price contract requires a few prerequisite to work as intended. Both owners and contractors should be experienced in underground tunneling, to make sure that necessary support is installed and that the specifications are met. Any mistakes or other issues can lead to disagreement over risk allocation. It's also important that representatives from both parties are willing and able to make decisions at the rock face, to determine necessary rock support. Mistakes can cause knock-on effect and schedule change, and affect the production. Additionally, the contract assumes that the work activities described in the BoQ can be applied to all situations.

3 Methodology

3.1 General

This thesis main objectives are to create an overview of disputes in underground projects ending with a court ruling. The goal is to collect data to determine how the level of complicated disputes has been over the past years, and determine the current standing in the industry. Furthermore, the study will analyze the cases in order to determine underlying factors for these disputes, in order to be able to identify possible mitigation measures to reduce the conflict level.

The limitations imposed on the study, as well as relatively few underground projects each year, results in an assumed limited data quantity to study. As for this reason, a qualitative research approach is chosen. This is a broad scientific approach encompassing several research methods. These are typically interviews, observations and document studies (Tjora, 2012), where the aim is to gather data which is difficult to measure or quantify. In contrast to quantitative research, which require large amounts of data to do a statistical or mathematical analysis, the qualitative approach examines people's perception and opinion of a given subject. The qualitative method will give a more thorough understanding of a limited subject instead of the broader results given by the quantitative approach.

Data is collected with a combination of the following methods, and will be further presented in this chapter:

- Literature review
- Document studies
- Interviews

Reliability & Validity

In a research study, it is of the utmost importance to provide both reliable and credible data. The aim of any research is to get an overall consistency of the measurements, known as the reliability of the data. The reliability is usually tested by repeating measurements or doing similar experiments, and a high reliability if results are accurate, reproductive and consistent for different test. The reliability is insured by using unambiguous indicator or preventing systematic errors in measuring devices (Samset, 2008). In regards to the reliability of the information, it is harder to insure quality of the data in qualitative research than in quantitative research.

It is also important to ensure that the collected data corresponds well to the real world. The extent to which a conclusion or measurement corresponds to the actual situation, is called the validity.

Unlike the reliability, it is easier to maintain a good validity with a qualitative approach than a quantitative approach, since the research can be adjusted as more information is gathered. The validity of the research is difficult to test, since the premise might change over time, and the validity of data is usually based on judgment. According to Samset, there are two considerations to make to insure the data is applicable for the study. The first is to choose indicators that gives a direct goal, and secondly, to use several indicators which together gives a good indicator for the case study.

Reliability and validity are visualized in figure 4. To achieve a valid and reliable result in this thesis, three quantitative approaches are used, as stated above. Additionally, the research is limited to the past ten years to insure valid data which is applicable for the current situation. Furthermore, interviews are performed with both owner and contractor representative, to get all views on the problem.

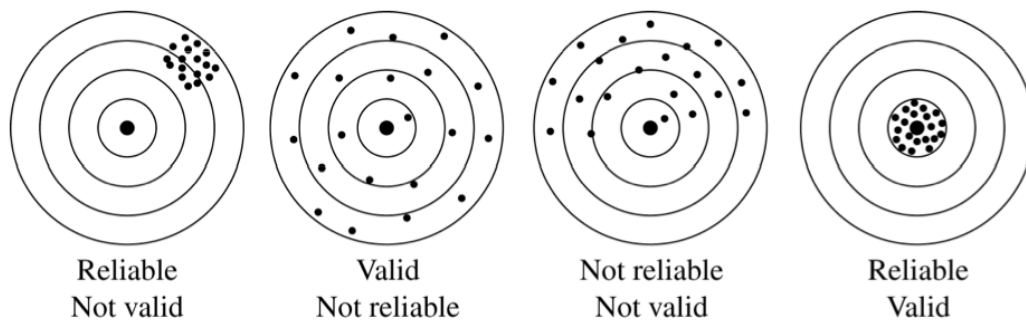


Figure 4: Visualization of reliability and validity.

3.2 Literature Review

An initial comprehensive literature review was performed at the start of the thesis work, with the aim of determining the industries standing and views on the problem about disputes in the underground construction industry. Further literature review has been a continuous process throughout the thesis work, to supplement and to substantiate the research.

The first priority was to find articles published in international journals and monographs. These articles are quality assured by the publishers and by peer review. Disputes in the Norwegian underground construction industry is a narrow field to research, and consequently, there are a limited amount on published literature. Therefore, the search was extended to include disputes in the civil construction industry in general, both nationally and internationally. Literature based on

projects in other countries or with other project types, might not be applicable to the thesis, as it might not be representative for the Norwegian contract system. It is taken extra precautions with this in the literature review.

Presentations and conference proceeding were a good source for relevant literature, since the dispute problem is more often presented in these surroundings. Information found here are used as supplementary data to back up the results from the document study and interviews. Conferences will be critically reviewed by peers from the industry, and will be a stage for knowledge exchange between industry professionals.

Finally, magazine interviews and websites provided an additional source of information. This provided an informal forum, where industry professionals have stated their up to date opinions on the subject. The focus has been on industry magazines and websites, and acclaimed newspapers.

3.3 Document Studies

In this thesis, the main objective was to collect data on recent court cases for underground construction projects, and to analyze the results. General information about the court cases are needed, as well as the claims from both sides, and the final ruling. The aim of the document study is to collect information on court rulings, in order for analyses of the following subjects:

- Reason for the litigation
- Duration of the court case
- Cost and financial assessment

Several approaches were used to obtain the desired data. According to the law of public transparency (Offentlighetslova), most public documents are available for the public to scrutinize, but there are no guidelines on where the documents shall be publicized. Therefore, several approaches were chosen to make the data collection as comprehensive as possible. The following approaches were used:

- Search Lovdata, a foundation which publishes judicial information.
- Contact District Courts and the Courts of Appeal.
- Search public journals.
- Contact companies and key industry people.

Lovdata

The preliminary search was done at Lovdata. This is a database run by a foundation to provide free juridical information, created by the Ministry of Justice and Public Security, and the Faculty of Law at the University of Oslo. It contains Norwegian law and regulations, legislative history, EU/EEA legal sources, administrative claims, court rulings and more. The site contains all rulings from the supreme court, and selective rulings from the District Court and the Court of Appeal. The court rulings are available for free for one year, and a membership is available to access the entire database.

A membership was obtained to access Lovdata PRO which allowed access to the entire database. In addition, the membership facilitated a better search mechanism, with filter options and the possibility to receive notifications when new documents with a selected description were added. This allowed for an easier and more selective search to be conducted, and secured an up to date data coverage.

The search in the database were completed by two approaches, where the first focus on tunnel construction, since this is dominating underground construction. The search results from both of these approaches are presented in table 1. For both of these approaches, filters corresponding to the limitations in this thesis were used. These filters were:

- Period between 2007 and 2017.
- Source of the documents: Court rulings.

The first approach combined all companies mentioned in chapter 1.3, bullet 1 and 2, with the filters above. The search was further narrowed by adding the search phrase “tunnel”. The search result of the final constriction is shown in parenthesis. The search also included Samferdselsdepartementet (The Ministry of Transportation and Communication), as they will normally act as one of the parties in a court case. The phrase “tunnel” was selected to narrow down the results, as a majority of disputes are not regarding underground construction. The phrase might exclude some project (e.g. rock caverns, storage rooms, underground parking), but the benefit of fewer results was assessed greater than the risk of overlooking relevant court rulings. As shown in figure 1 in chapter 1.1, these projects only contribute to a small percentage of the total underground excavation. Any eventual court cases regarding these types of projects were therefore assumed to be found with the second approach.

The second approach included the names of either the owner or contractor, and a third filter selecting which section of the law to include. The aim was to catch all projects not included in the first approach. The third filter narrowed the search to only include documents regarding tendering, agreement and construction law (In Norwegian: Anskaffelser, avtaler, bygg og entrepriserett).

The number of search results from each approach provided are shown in table 1. The numbers include results that are not relevant for this thesis, and will also include several results from the same case if it was appealed to a higher court. Furthermore, the search engine base the result on the text in the documents, which can give results not relevant for the thesis objective. As an example, a company employee can be a lay judge or an expert witness, and will show in the case documents, even though the case is between different parties.

Table 1: Results from Lovdata search

Company Name	Approach 1	Approach 2
Samferdselsdepartementet	374 (51)	36
Statens Vegvesen	786 (94)	45
Statkraft	71 (10)	-
Jernbaneverket	126 (25)	13
Veidekke	181 (19)	24
Implenia	4	1
Skanska	101 (8)	18
NCC	99 (18)	12
AF gruppen	175 (5)	9
LNS	7	4
Kruse Smith	28 (1)	1
Marti	4276* (53)	113
OSSA	3	0
Hæhre	21 (7)	5
Mika AS	16	31
Mesta	451 (28)	35

**The search phrase "Marti" was interpreted as part of the name Martin, which gave an unusual high number of results.*

The results from the search in Lovdata does not guaranty all court cases in the period between 2007 and 2017 are shown. Since the database is a foundation, the courts are not obliged by law to post rulings on the site. It is up to either court if they post it, and even though most of them do, there is no overview of to what extent they publish. Some of the District Courts and Court of Appeal might only publish important rulings affecting the interpretation of the law.

District Court and the Court of Appeal

Since there is no guaranty that the database Lovdata will have all the court rulings available, an inquiry was made to all District Courts and Court of Appeal. A list of all the courts in Norway can be found on the Courts of Norway's home page (The Courts of Norway, 2017a). This list also includes all the land consolidation courts, which is a tribunal instance handling owning rights of properties. These tribunal courts are not contacted as they will not handle disputes concerning contractors.

Identical inquiries were sent by email to all the District Courts and all the Court of Appeal. No inquiry was sent to the Supreme Court, as they publish all rulings at Lovdata. The inquiry sent can be found in appendix C. Out of a total of 69 inquiries (63 to the District Courts and 6 to the Court of Appeal), 38 responded. The following information were presented in the inquiry:

- General information about the thesis, as title and research objectives. The goal is to present the inquiry as professional as possible, to avoid it to be discarded. A specification was made that the disputes researched were between owner and contractor, and for underground projects.
- A list of all company names this study comprises. These correspond to what was explained in chapter 1.3. Jernbaneverket was used instead of their current name Bane NOR in the inquiry, as their former name is most likely used in the court documents.

Since there is a limited amount of court cases regarding underground construction each year, most courts will not have any documents to share. It can be a higher chance to get reply from courts that did not have any cases, as it will require little work. Some might also not bother or have the time to find old files that fit my description. Another concern is that the courts might overlook relevant documents, or assume they don't have any.

Electronic Public Records

Central governmental agencies, including The Ministry of Transportation and Communication, and its subsidiary organizations publish public documents in an electronic database, the electronic public records (Norwegian abbreviation: OEP). In this database you can find documents that are sent from or received by an agency, as well as internal documents. It is part of the Norwegian governments work to provide transparency and democracy within the public sector (Difi, 2017). The public is open to search for documents in the database, and can request to view these. The

request is sent to the relevant agencies, which in turn process the requests, and send the reply directly to the user.

The main goal of this search was to get hold of settlements between contractors and the state, to be used to analyze possible differences between settlements and court rulings. Additionally, the results can uncover court cases overlooked in the other approaches. The drawback of collecting settlements is that the majority of the data will be restricted from view, as they contain confidential information. The availability of the documents is regulated through the law of public transparency (Offentlighetslova), and not all documents will be available to the public. The exception to public availability is regulated through §§13-27.

Since the database cover all government agencies, and all their documents, the search criteria had to be more detailed than for the search in Lovdata, so the advanced search option was used. The search parameters were as follows:

- Specified publishing date from and including January 1st 2007 to and including February 23rd 2017.
- Search both case title and document title. The search phrase used was “forlik” (settlement) combined with the companies listed in chapter 1.3.
- Case or document number, sender or recipient, document type, grounds for exemption or archive code; were all left unspecified.
- Selected documents regarding the following agencies (In Norwegian).
 - Bane NOR
 - Jernbaneverket (until January 1st 2017)
 - Samferdselsdepartementet
 - Statens vegvesen Region Midt
 - Statens vegvesen Region Nord
 - Statens vegvesen Region Sør
 - Statens vegvesen Region Vest
 - Statens vegvesen Region Øst
 - Statens vegvesen Region Vegdirektoratet

Contact companies and key industry personnel directly.

In addition to the approaches mentioned this far, inquiries have been sent to all contractors and governmental subsidiary organizations mentioned in chapter 1.3, as well as to industry experts and law firms specializing in construction law.

The industry experts and law firms were recommended by the advisor, and in many instances, he did the first inquiry. The following people have been contacted per email:

- Kluge law firm. This law firm is a recurrent representative for many of the larger contractors, and has assisted public owner companies. The representative contacted was Espen Nyland.
- Føyen|Torkildsen law firm. One of their specialties is construction law. They have a framework agreement with Statens Vegvesen regarding representation in court cases. Two representatives, Andreas Rostveit and Hanne Knudsen, were contacted.
- Steinar Roald. He has been a participant in many court cases over the years, often as an expert for the contractors.
- Eivind Grov, professor and chief scientist in Rock engineering at SINTEF Building and Infrastructure.
- Fridtjof Andreassen from Aas-Jokobsen consulting company.
- Pål Egil Rønn in AF-gruppen.

From a total of 21 inquiries (11 contractors, 3 owner companies, 7 industry professionals), 8 responded. The responses were from NCC, Hæhre, Kruse Smith, Norwegian Public Road Administration, Bane NOR, Kluge law firm, Eivind Grov and Pål Egil Rønn. From these responders, only the governmental subsidiary companies had relevant documentation to share. Bane NOR had one new court case to share and the Norwegian Public Road Administration shared three. These court rulings were not available from the other databases.

3.3.1 Data Analyses

The document study resulted in a total of fourteen court cases. A complete overview of all the data from these cases can be found in appendix A. The data used in the analyses will be extracted from this overview. It will also include necessary information needed to locate the documents. The court cases are listed by year, from old to new. The following information is presented:

- Case name. Case name includes the suing party and the sued party. This will be equivalent to owner and contractor. The Ministry of Transport and Communication (Samferdselsdepartementet), representing the Norwegian state, will in most cases be noted as the owner. The work related to the court case is done by the subsidiary company and external professionals, in the name of the state.
- The court name and the case number. The name of the court where the case was tried, and the case number given to the case, are all the necessary information needed to easily get a hold of the case documents.

- Dates. Two dates are shown, in the format dd.mm.yyyy. The first date will be the day the case was plead to the court for the first time, and the second will be the date of the final verdict. The latter date might include the date when an appeal was rejected.
- Reason for litigation. This is information on why the dispute was brought to the court. It is limited to keywords. The whole case description can be found in the court documents.
- Contractors initial claim. This will include an aggregate number of all the claims put forward in the district court. It will not include claim for additional time. All numbers will be in Norwegian kroner (NOK).
- Owners initial claim. Same as above.
- Paid to contractor. This column contains the aggregate payment from all the claims they were awarded. This number does not include any possible legal cost, which is presented in the next row. This will be marked as 0 if each party had to cover their own legal cost. All numbers will be in Norwegian kroner (NOK).
- Paid to owner. Same as above.
- Notes. Any special notifications not covered in the other columns are written here.

This data from the document study will be graphically represented in several ways. The data is broken down and presented separately to illustrate the results. Four topics is chosen to analyze; reason for the litigation, court rulings per year, time spent in court, and cost and financial assessment of claims. All analyses are thoroughly described below.

Reason for Litigation

To determine which types of disputes ends in court, the data was extracted to form a column graph showing the different reasons for the litigations. The goal was to get a sense of what type of disputes were represented, and in what extent. Similar reasons were placed together in collective categories, totaling four different categories. These were organized based on the contractor's reason for the claim. Owners counterclaim might originate from other reasons.

It was determined to comprise the results in four categories, as the cases originated from disputes with similar properties. The following categories were chosen, with a description of what kind of disputes they contain:

- Changes. This category comprises litigations caused by disagreement on how changes in in the project affected the planned schedule and progress, or over reduced productivity.

- Document interpretation. This includes contractors claim for additional remuneration caused by different interpretation by owner and contractor of the contract documentation. This category also include disagreement about which process code is valid and which price applies to the performed work. This category also includes price adjustments.
- Contract cancellation. This includes cases where the owner has decided to cancel a contract with the contractor, after the work has initiated.
- Tendering process. This category will include cases where the contractors tender has been rejected by the owner and when the tendering process has been cancelled.

Court Ruling per Year

To establish an indication on the number of court cases each year, two column chart are created. One showing the number of litigations by year, and the second showing the year of the court ruling. All the data is based on the fourteen cases studied in this thesis. These figures will not illustrate the duration of each case, which is shown in an above-mentioned analysis. The result will only comprise court cases ending with a ruling, and no disputes ending outside of the court system are included.

The first figure is based on the date the litigation was sent to the court. The second figure utilizes the date for the final court ruling. All dates can be found in the overview in appendix A. The chart does not differentiate between the different months. The amount of data was to limited to base it on months.

Time Spent in Court

The goal of this analysis is to determine the invested time needed to bring a case to the courts, and how long it takes before a final court ruling is set.

The period is presented in both months and years. This is calculated using the date when the case was first put to the court, and the date of the final ruling (either court ruling or dismissal of appeal). The difference was calculated using a standard DATEDIF function in excel, calculating the total number of days between the two dates. This was converted to months by dividing by the average numbers of days in a month (30) and rounded to the nearest whole month. The days were also converted to years by dividing by 365, and rounded to one decimal. The data is not sufficient to make a quantitative analysis, so the precision of the results are not that important, and the results will be sufficient to answer the research questions.

The results are presented in a scatter chart, where the results are presented on two different axes. The left axis shows results from court rulings in the District Court, and the right axis shows result from disputes taken to the Court of Appeal. This will also include the cases which was appealed and rejected in this court. The values of the dots correspond to the number of months and years, shown on the left and right y-axis, respectively.

This graph will not show how complicated the dispute was, how much time was invested, other work on the dispute or other eventual pauses/holidays. In addition, this will not represent eventual negotiating prior to the litigation. This can in worst cast be an ongoing discussion during the entire project duration.

Cost & Financial Assessment of Claims

This analysis will illustrate the financial situation of the court cases. The aim is to figure out if there is a trend in the initial demand give a litigation cause, and what the contractors or owners end up with after a court ruling.

A table presenting all the information used in the charts, showing the data for each individual case, are presented prior to the charts. This contains extracts from appendix A, containing all data used in the analysis. Initial claim and final outcome for both contractor and owner is presented in separate columns. The percentage of the final outcome in comparison with the initial claim, for both parties, are presented in an adjacent column. The percentage is rounded to the nearest whole number. The table is created to visualize the differences between each case in the same category. A drawback with the bar chart is that total values are presented. It can only be used to see the differences between each category, and not between the different cases in each category.

The data is organized after the same categories as described in “reason for litigation”, and an additional category combining all court cases, labeled “total”. The data are presented in a stacked bar chart, showing the initial claim for both contractor and owner, and the final payment awarded to either party for each category. The initial claim and final outcome for both owner and contractor is presented side by side, with a space separating the owner data from the contractor data. This is done to easier distinguish between the opposing parties. The total claims are calculated by adding together all claims in case category. All numbers are presented in Norwegian kroner (NOK).

The legal costs for the court cases are presented in a separate column chart, showing legal cost awarded to contractors and owner. The values are presented as the accumulated value for all fourteen court cases. The value for the OSSA v. Samferdselsdepartementet is singled out, as this is an extreme value compared to the average.

3.4 Interview

Interviews were conducted to obtain supplementary information to the document study, both to back up findings and to get an overall view of the subject. Qualitative interviews are well suited for this purpose. Both contractor and owner representatives were interviewed, to obtain perspectives from both sides. The aim was to clarify differences and similarities on the subject from all involved parties.

It was decided to limit the number of interviewees as this part of the research is secondary and supplementary work to the document studies. Representatives from two of the leading contractors and one from the public road administration were interviewed. This skewed representation is voluntary, and is given by the nature of the thesis objective. Several construction companies are represented in the different disputes, in contrast to the few public subsidiary companies. It was decided it was more important to cover the possible different views the contractors provide on the subject, on expense of a more skewed perspective.

A questionnaire was considered but quickly dismissed, since there is a limited group of people working in the underground construction industry, which is also involved in construction disputes. The aim of these interviews is partly to figure out *why* disputes occurs, which is more difficult to accomplish using a questionnaire.

There were two main limitations resulting in only three interviews. There was limited time available to organize and perform the interviews after the document studies, and the availability of representatives with the right experience. It was decided to perform all interviews in the Trondheim area, to be able to accommodate and schedule all interviews according to the interviewees schedule more easily. Inquiries were sent to companies represented in the Trondheim area for this reason. These only included The public road administration, NCC and Veidekke, which all agreed to interviews. The interviewees were appointed by the companies, on request that they had previously been involved in dispute resolution or worked on court cases. It was specified that the questions would not involve sensitive information on past court cases or any other information that could harm the involved parties. All interviews were held at their office at a time of their choosing.

The interviews were conducted as individual, in-depth interviews, aiming for each interviewee to speak as freely as possible about the subject. To make sure all the interview stayed within the research scope, an interview guide was made beforehand. The interview guides can be found in appendix B, and are written in Norwegian. One interview guide was made for the contractors, and one for SVVs representative. They differ in the way some questions are presented, but follow the

same structure. The guides contain four main questions concerning several aspects of disputes in the industry; the dispute situation today, causes of the conflicts, solutions to the problem, and work related to court cases. The first topic will cover their view on the dispute level in the industry as it is today, and to reflect on the development over the past years. The second and third topic contains questions they have to (in some degree) reflect upon. These will try to uncover their view of the problem and possible solutions and the aim is to establish any different understandings on the subject between the parties. The final topic contains factual questions concerning the work related to court cases. After each interview, the questions were revised, but the initial questions prepared were sufficient. The questions were made to be as open and at the same time precise, to allow for broad answers covering as much as possible about the topic.

A tape recorder was used in the interviews, to be able to replay the interview at a later stage. The intent was to reduce the possibilities of misunderstandings and be able to go back to the answers in retrospect. All interviewees were informed about this ahead of the interview. A drawback of this approach will be that the interviewees might be reluctant to speak freely when the conversation is on tape. The use of the tape recorder allows for better communication between each person, as there is no need to write a protocol to keep track of each answer, so this approach was decided to be well suited for the purpose and outweigh the negative aspect.

After each interviews, the records were transcribed as fast as possible. It was decided to keep the records from the meeting as accurate as possible, to avoid any subsequent disagreement over what was said.

3.4.1 Interview Analysis

The main challenge in analyzing the interviews were to filter the information, and to understand that their affiliation to a company might affect their answer. The analysis focus on the subjects from the research guide, to analyze similarities and differences between the parties.

All interviewees were allowed to talk freely in the interviews, and as a result the answers will differ significantly from the guide. Answers not applicable for the research questions, were assessed as not relevant, and not used in the results and discussion.

4 Results

The results from the document study and interviews are presented in this chapter. An overview of the court cases can be found in appendix A, and these findings will be presented in detail in this chapter. Different data from the overview is extracted to create figures to better illustrate the findings. The results and analyses from the following four main findings in the document study are presented in this chapter:

1. Reason for litigation
2. Court rulings per year
3. Time spent in court
4. Cost & financial assessment of claims

The results from the interviews are presented at the end of this chapter.

As part of the document study, a search for documents regarding settlements was conducted. As most of these disputes are subjected to confidentiality, the search yielded few results. Six relevant settlement agreements were obtained. The study has indicated that most dispute ends in a settlement, so these results are too limited to analyze, and they are therefore not included in the results. Additionally, it is a chance that the documentation received was provided since it presented the company in a favorable light, so the information is considered biased.

The documents provided do indicate that these disputes have the same characteristics as those ending in a court ruling. The data base is not sufficient to determine what separates these disputes from those ending in the court system.

4.1 Reason for Litigation

As stated in chapter 3.3.1, the fourteen court cases studied were organized in four different categories, depending on the reason for the litigation. The aim is to visualize which types of disputes ends in the court system. The number of court cases in each category is shown in figure 5.

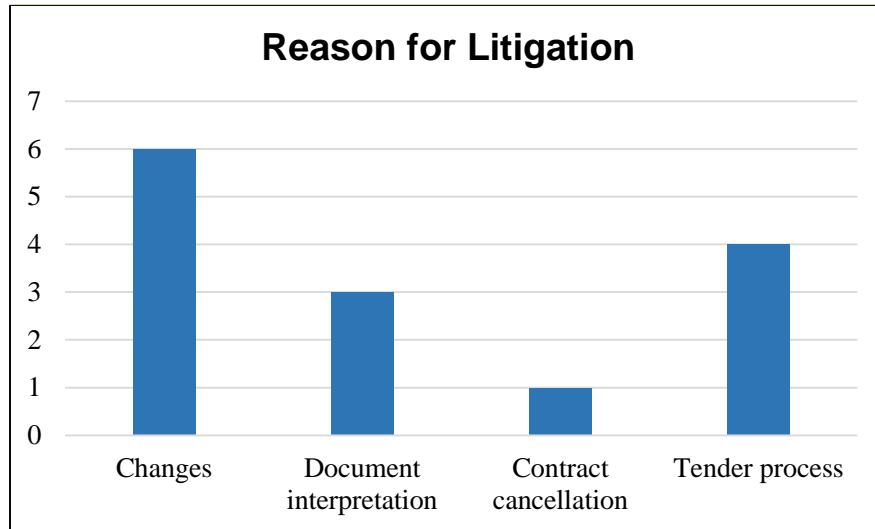


Figure 5: The main litigation cause for the cases studied.

Most cases resulting in a court ruling are the result of changes, and 6 out of 14 cases studied had changes in the project as the main reason for litigation. A change can affect or disrupt the planned productivity in the project down the line. As the contractor is responsible for the productivity in the project, these knock-on effects will force the contractor to implement measures to compensate for lost time. The contractor will claim both time and financial compensation for the change. Which party were responsible for the original change, who were carrying the risk, and if the changes were handled according to the contract are the core issues of these disputes.

Out of the cases studied, 3 of 14 were the direct result of different document or contract interpretation between owner and contractor. Different interpretation between the parties can cause misunderstandings, potentially leading to conflicts in the construction phase. A major issue of these disputes are disagreement on which process code or which contract price applied to any given work performed. Furthermore, disagreement on technical or functional requirements in the contract can cause conflict if the contract documents are unclear or misleading. Additionally, when working on final account, it is often necessary to adjust prices so they follow the natural inflation in the market. Any unclear contracts can lead to large claims. All of these conflicts can potentially result in large claims for remuneration and time extension.

For an owner to cancel the contract with the contractor is a rare occurrence, and has only happened once over the past ten years this study encompasses. The contract used in this instance were a unit price contract, awarded to the bidder with the lowest price. The contract was terminated after the contractor was unable to follow the planned progress, and was several weeks behind schedule. The contractor claimed an unlawful cancellation, taking the case to the court.

4 of the court cases are related to the tender process. These instances are the result of a contractor's claim of a wrongful tendering process, and there are two instances where the contractor litigates. Firstly, if the tender was cancelled prior to selection, the contractor might demand compensation of any work that was performed, or if they claim the cancellation was unjust. Secondly, if a contractor loses the bid, either by disqualification or as a runner up to the winner, the contractor might see the decision as unlawful, either for wrongful disqualification or claim the other contractor should have been rejected based on the award criteria. In both cases they might demand either compensation for the work put into the tender, or to be compensated for any lost calculated revenue.

The findings in this analysis show that the majority of cases are the results of changes causing a knock-on effect on upcoming work processes, resulting in production or productivity disturbances. It is difficult to agree on how any change affects a given project, since there are complex dependencies to consider. Misleading or insufficient contract documents can make it unclear on who is responsible for any risk related to any given incident, or how any changes should affect future risk allocation. Since it is difficult to agree on how an event affected future progress and situations, especially if there is a lot of money involved, these disputes might have a higher chance of ending in the court system.

Both the categories document interpretation and tender process are concerning disputes originating in how the contract documents are interpreted. This might have their origin in insufficient or unclear tender documents. Larger and more complex projects will be more expensive, and combined with a decreased quality on documentation, the projects might be more prone to develop conflicts and disputes.

Additionally, almost all contracts in underground construction use unit price contracts. The main drawback with this contract type is that tender bids are only based on the tender documentation. If the bill of quantity described deviated substantially from actual met conditions, discussion will arise on which process code is valid, or how any measures should be compensated.

4.2 Court Rulings per Year

Figure 6 and 7 show the year of the litigations and the year of the court rulings. These numbers only represent litigations ending with a court ruling, while there are also an unknown number of cases reaching a settlement prior or after litigation, which are not shown here.

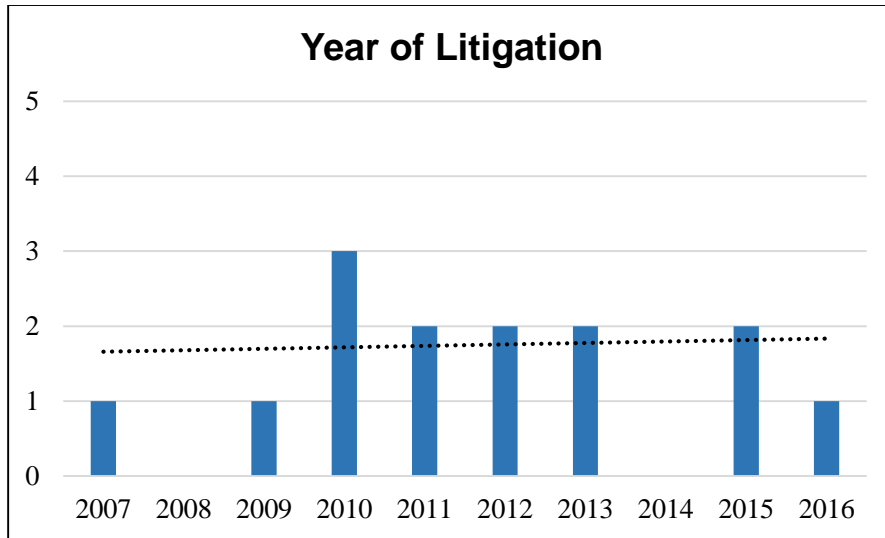


Figure 6: Year of litigation for the studied court cases.

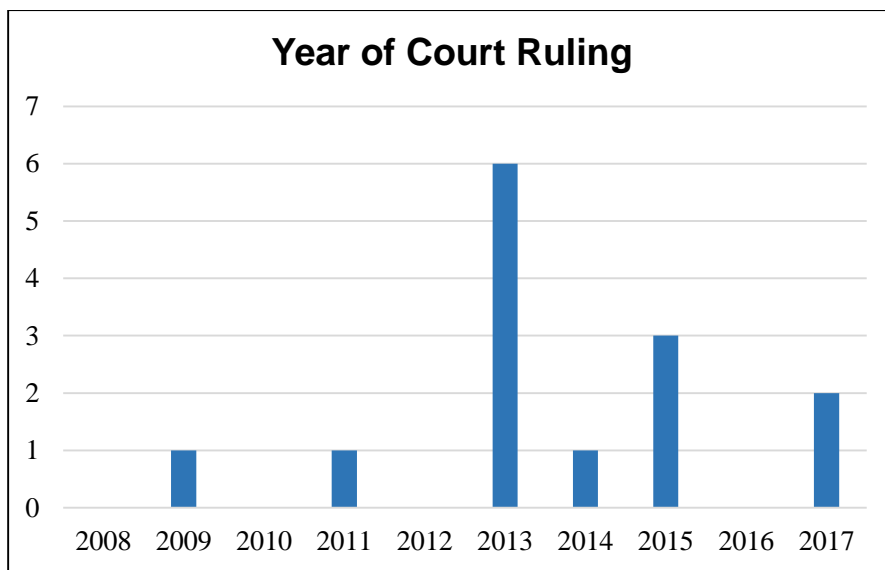


Figure 7: Year of court verdict for the court cases.

Over the past ten years, the number of litigations to the court system has been relatively stable, as seen in figure 6. It has been between 0 and 3 cases each year, with a very slight increase over the years, as shown in the trend line. There are no data on the total number of litigations sent to the courts, so a detailed statistical analysis is not possible.

Figure 7 shows the year each of the court cases studied in this thesis received the final ruling. The year each verdict was reached vary a lot, and there is a spike in 2013, where 6 out of 14 verdicts

were reached. There is no obvious correlation with figure 6. No trend line shown in the figure, since the time to solve a case in court can vary substantially, which will be discussed later in this chapter.

The figures can indicate a stabilization, if not a very slow increase, in the number of disputes taken to the court system each year. Figure 7 indicates a possible top has been reached, but still an increase from the earlier years. An important point to remember is that this study only include concluded cases, and there will be a number of ongoing cases not incorporated in this study. The graphs can change as more cases are concluded.

On average, more than one case is sent to the court system every year, excluding all disputes ending with settlements. This number is very high. This can indicate two things. Firstly, assuming a small percentage of disputes end in a court ruling, and this percentage is near constant, the dispute level in underground construction is very high. Secondly, it can indicate that a high percentage of disputes in the industry are taken to the court system.

4.3 Time Spent in Court

All parties can spend substantial amount of time working on a court case if the dispute is not resolved at an early stage. Figure 8 shows how much time passed for each of the fourteen cases, between the time the litigation was sent, until a final verdict was given. This gives an indication on how much time is spent processing each court case. The chart is divided in cases ending in the District Court, and cases ending in the Court of Appeal. Cases appealed to the second court, but refused, are included in the second axis.

The cases studied shows that there is a wide range on how long it takes to reach a court ruling. Disputes ending in the District Court ranged in time from 10 months and up to 27 months. This is equivalent to just under a year to over two years. On average, these cases take 18 months, or one and a half years to finish.

Cases appealed to the second court take longer time to solve, as an obvious consequence of taking the dispute to a second round in the system. The collected data show that these cases take between 17 to 49 months, or an equivalent 1.5 to 4 years, from litigation to final ruling. On average a case taken to the Court of Appeal take 31 months or 2,5 years, to reach a verdict. The cases in this study show a larger spread than for the District Court. The reason is that both cases where the appeal are processed and rejected are included. The cases that are processed will naturally take longer to reach a verdict.

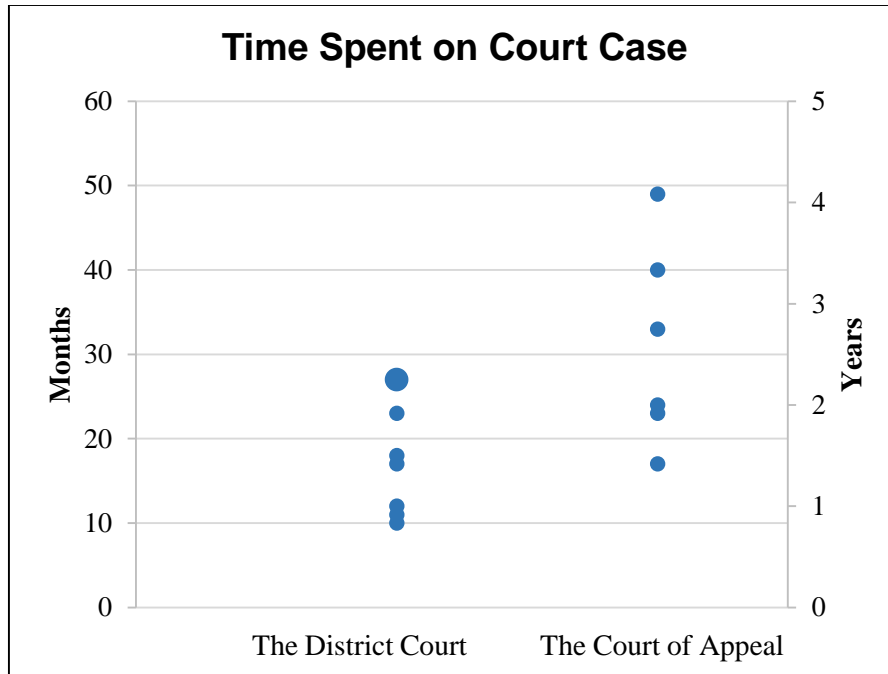


Figure 8: Time from litigation date to court ruling date.

According to the Courts of Norway’s own statistic from 2016 (The Courts of Norway, 2017b), the average time spent to process a court case were 5,2 and 5,8 months, for the District Court and the Court of Appeal respectively. Cases regarding underground construction takes significantly longer to finish. This is probably the result of the scale of the projects and the disputes, and the level of documentation and personnel that are involved in preparing these cases. For one party to familiarize with the litigation claims, and work on a counter claim, can take several months. The actual court case will normally only last a few days.

4.4 Cost & Financial Assessment of Claims

Each dispute taken to the court system originate based on different circumstances, and have different claims. It is important to remember that each case is unique, with different types of processes, uncertainties, budgets, schedules and personnel. These variables affect the claims in the litigations. The table below contains an overview of each court case studied, organized by the same categories as above. Each case has listed the initial claim for both parties, and the final payment to either side. The percentages show how large the final financial payments are compared to the initial claim.

Table 2: Overview of initial claims and final outcome in the court cases. C = Contractor; O = Owner.

Category	Contractor	Initial Claim [NOK]		Final Outcome [NOK]		%	
		C	O	C	O	C	O
Changes	Mesta	51,600,000	-	37,277,746	0	69%	-
	Mika AS	105,000,000	-	160,000	0	~ 0%	-
	NCC	78,986,023	-	38,340,353	0	49%	-
	Mika AS	37,087,252	-	10,595,500	0	29%	-
	LNS	55,000,000	38,287,161	5,598,072	3,400,000	10%	9%
	Skanska	62,666,272	-	6,250,000	0	10%	-
Document interpretation	Mesta	60,592,274	-	23,177,744	0	38%	-
	Veidekke	7,603,115	-	290,950	0	4%	-
	Veidekke	59,009,690	-	50,283,816	0	85%	-
Contract cancellation	OSSA	383,912,995	84,355,128	0	78,835,439	0%	93%
Tender process	Mesta	51,600,000	-	880,000	0	2%	-
	Skanska	58,500,000	-	56,000,000	0	96%	-
	NCC	75,099,175	-	0	0	0%	-
	Skanska	305,378,109	-	305,378,109	0	100%	-

There are large differences in the outcome of each court case, as a percentage of the initial claims in the litigations. The percentage vary over the entire scale for the contractors. It is also clear from the data that all claims ending in a litigation, is in the tens of millions of kroner. The lowest claim is for over 7,6 MNOK, and the largest claim is for well over 383 MNOK.

What the final judgment awards either side, is in most cases substantially lower than the initial claim. The contractor receives over 50% of their initial claim in 4 out of 14 cases studied. In the other 10, the contractor gets less than 50%. Most of the cases end with the contractor getting parts of their claim covered, but two cases yielded 0% to the contractor.

The two categories that stands out from the rest is the tender process and contract cancellation. The data shows that the end result from the court is on either side of the scale. They will either end up with nothing or a very small percentage of the initial claim, or achieve up to full payment of the initial claim.

All cases are concerning economical compensation for various reasons, and since the owner is responsible for payments, the claim is usually towards them. The collected data show that the owner rarely has financial counterclaim, and of the fourteen cases studied, they have only claimed compensation twice. These claims are concerning reimbursement for advanced payments made to the contractors. It is also worth noticing that the owner win parts of their claim in each instance.

The financial claims from both owner and contractors are presented in figure 9. The data is organized by the same categories as table 2, showing the aggregated claims in each category. Furthermore, the aggregated claims from all cases are shown in the top bar.

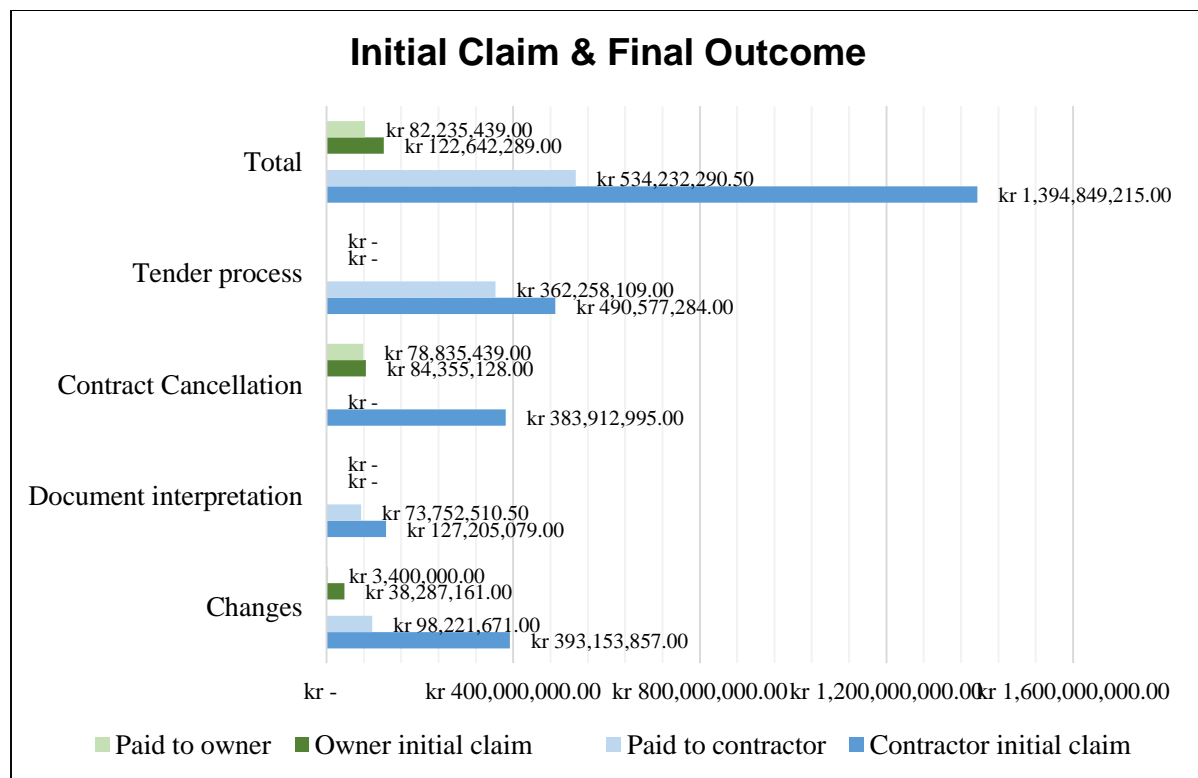


Figure 9: Comparison between initial claim in litigation to the final outcome.

In disputes that have their origin in the tender process, the claims are only from the contractor. Of the four cases found in this category, the total claim from the contractors exceeded 490 MNOK. All of these claims are over 50 MNOK, but the most recent case between Skanska and Bane NOR was at 305 MNOK, which is a significant part of the total. All these court cases are based on lost potential revenue for the contractor. The amount paid to the contractor after the court ruling, is

substantial compared to the total claim. This is a result of aforementioned Skanska case, where the contractor was awarded the entire claim.

Contract cancellation is a rear occurrence, and there has been one case in the court system over the past ten years. In this instance, the contractor made a claim for compensation for lost revenue and damaged reputation. The court did not rule in favor of the contractor on any of the claims. The owner had on the other hand a counter claim demanding compensation for the additional work required to acquire another contractor to finish the job, as well as to get reimbursed for any advance payments given. The total claim from the owner were 84 MNOK, and the final ruling awarded the owner almost all of their claim.

Document interpretation have in the cases studied on average had lower claims from the contractor compared to the other categories. There are no claims from the owner in any of the cases. The data shown that the average outcome from these disputes is the contractors favor.

The majority of court cases are regarding changes in the project, and the claims from the contractors totals almost 400 MNOK. After the cases have been tried in court, the contractors are payed a total of just under 100 MNOK, or just about 25% of original claims. This will vary a lot from case to case, where the contractor in some case get a high percentage of the claim, and in some instances close to nothing. Production disturbances are the main reason for these claims. These knock-on effects are complicated and interconnected with the project, making it difficult for the involved to agree on a causation. These disputes are less based on law and document interpretation, and are more likely to end with “both parties being partly right”.

The total bar, containing all subsequent categories summed together, shows that the average outcome from the original claim are very similar for both contractor and owner, but there is obviously a substantially larger claim from the contractor. On average, the contractors get 38% of their claim after a court ruling, and the number is 67% for the owner.

The two most recent cases from Skanska and OSSA stand out, with claims at 305 MNOK and 384 MNOK respectively. These are significantly larger than all the rest of the cases in this study. The Skanska case are claim for compensation for lost revenue, and the OSSA claims compensation for both lost revenue and damaged reputation. Other cases in this study is concerning smaller changes or parts of the contract, which in turn keeps the claims relatively small compared to the project size. Both of these court rulings have been appealed, and are of this time not concluded.

Legal cost

The legal cost related to a court case can be substantial, and end up in millions of kroner. The cost is carried by each party until any potential ruling is met. The final verdict might include one part covering the others legal cost. Figure 10 illustrates how much is paid to the contractors and the owners, shown in total for all fourteen cases studied. The information regarding each individual case can be found in appendix A.

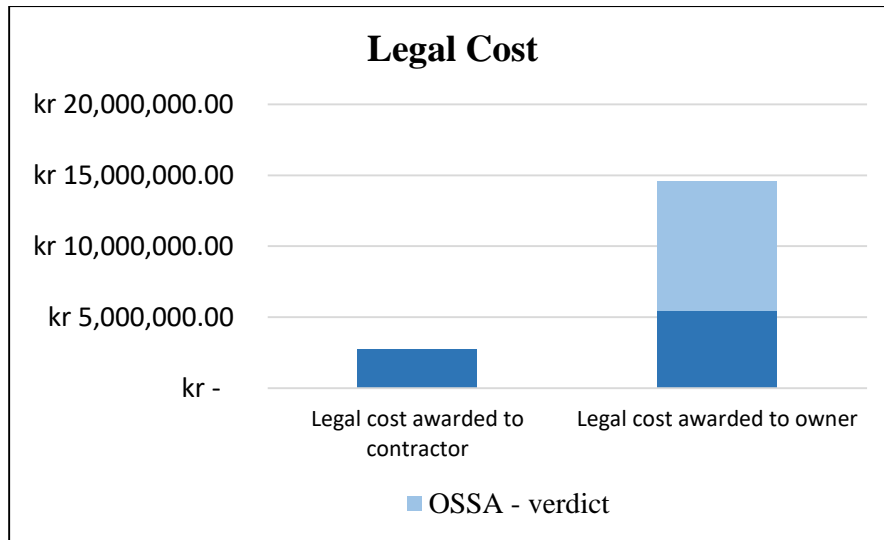


Figure 10: Overview of legal costs covered by the other party.

The contractor's legal costs have been covered by the owner in 3 of the cases, and the other way around in 5 of the cases. A total of 2,7 MNOK was given to the contractors, and a total of 14,6 MNOK was awarded the owner. The OSSA-verdict is singled out in the column chart, since it is very large compared to the other cases. Legal cost of over 9 MNOK was awarded the owner, which is more than the others combined. Excluding this case, the amount paid to the owners is roughly 5,5 MNOK.

In 6 of the 14 cases, each party had to cover their own legal cost, and there is no documentation on the amount. Legal cost is only covered if one party get all or most of their claims ruled in their favor. If both parties get some of their claims ruled in their favor, each party will usually have to cover their own expenses. The legal cost shown in the figure will in some cases only contain the cost of appealing the case.

4.5 Interviews

All three interviewees agreed that the level of disputes have increased significantly over the past years, but the increase have now stagnated at a high level. The main effort of the interviews was to figure out what the industry representatives thought about the subject, and what they claimed were the causes of the high dispute level. This section summarizes what the representatives see as the main issues towards disputes. They collectively emphasized four main reasons for an increased dispute level; award criteria used, tender documentation, knock-on effects and authority or will to solve problems early.

Table 3: Interviewee name with associated organization.

Interviewee	Organization
Harald Inge Johnsen	Statens vegvesen
Tedd Årnes	Veidekke
Anders Haukedalen	NCC

Award criteria

There is a higher number of competing contractors in the industry, leading to a high competition for projects. The most common award criteria have been based on lowest price, and the tough competition can force contractors to price the tender offer below their own profit margin, to win the job either to secure turnover or to position themselves in the market for future jobs. If a contractor lose money on a project, they are forced to seek remuneration where they can, which can in turn deteriorate the relations with the owner. Bad relations in a projects makes it harder to solve problems early, which increases the dispute levels.

Another aspect to consider is how the contractors handle the risk of any potential changes to the projects or changes in met conditions. With award criteria based on lowest price alone, they might price very optimistic to get a low tender offer, and thus win the contract. This lower price can be at the expense of contingencies, and there is a gamble from the contractor that no large changes will occur. If the opposite happens, they might end under budget, and will seek additional compensation where they can. This will then lead to severe discussions with the owner, and increase the risk of going to court.

Harald Inge Johnsen emphasized that this award criterion by lowest bid involves the contractor at a late stage in the planning process, after the design phase. They have often no say in technical solutions selected, or if these are the best suited for the project. In addition, the contractor might not get the same ownership over the projects as they should. The late involvement can also prevent

the contractor to get a deep understanding of any potential problems or situations that might occur, which can prevent a comprehensive and adaptable schedule.

Any award criterion based on lowest price does not guarantee that the tender offer includes all costs, and there is no guarantee that the lowest offer has the “right” price. These contracts are also susceptible for tactical pricing, where the contractor gambles on which construction method are going to be used. The methods they think will most likely be used, are priced high, and the others low, so to present a low offer. If this backfires, the contractors will look for compensations elsewhere, leading to disputes with the owner.

Tender documents

The unit price contract has typically been used in Norwegian tunneling projects (Grøv, 2012). This contract type work well as long as any variations in work can be met by the variation of quantity or the standard capacities set in the contract. Any problem occurs when the actual conditions met differ significantly from what was specified in the documents, and work processes are not covered by the tender documents. Unit price contract is therefore dependent on the planning phase, and in large and complicated projects it can be difficult to have sufficient planning covering all aspects. Any changes or mistakes leads to claim for compensation from the contractor, and disputes can arise.

Ambiguities in the documents or miscommunication might raise the question “should the contractor have understood the meaning of the documents?”. According to the contractors interviewed, it happens from time to time that contractors understand, but choose to ignore any weaknesses, to be able to exploit it later. It might also be as a financial necessity, as the increased contingency required to cover mistakes, can increase the tender offer over lowest price. In order to win the bid, they can be forced to ignore it.

An earlier involvement in the project were raised as an important aspect by all interviewees. By achieving a good co-operation between the involved parties, any weaknesses can be addressed at an early stage, and contractors can suggest solutions they know and have experience with, which in turn reducing the cost. This can also give the contractor a better sense of ownership over the projects. This do require that the contractors take time and energy to participate in the work, and do not end up as a passive part.

Knock-on effects

All interviewees identified disputes concerning progress disturbances and following knock-on effect as the most difficult disputes to solve early, and the dispute most prone to be taken to court.

There is often difficult for owner and contractor to agree on how any changes affect the schedule, or if any contingency measures should have been done differently. It can also be difficult to see the consequences of changes before the project end, which results in a large final claim for remuneration. It is easier to understand how things should have been done in hindsight, further diminishing the co-operation in the project.

Larger and more complicated projects are harder to plan, which can lead to several changes. The representative from the Public Road Administration stated that he thought the planning work had deteriorated over the years, and that the productivity in construction has decreased to some extent. He pointed to an increased number of foreign worker, which might have a different way to work, as one of the reasons.

Authority to make decisions

The final point made by the interviewees were concerning authority to make decisions on site, but the opinions differed significantly from contractors to owner. Representatives from Veidekke and NCC said they felt the owner's project leaders had less will, authority or authorization to approve remuneration for changes, and that this led to stalemates in any negotiations. They stated that the owners no longer are able or willing to solve problems as they arise on site, stopping disputes from being solved during the construction phase. The disputes accumulate to the final meetings, growing bigger and more expensive, with larger claims from both sides. Larger claims are more likely to exceed any given authorization to remunerate, and more likely to involve personnel higher up in the system.

On the other hand, the owner's representative felt like he had sufficient authorization to approve changes, and that the problem is at the contractor's end. He stated they did not report claims for remuneration early, and speculate in earning more by saving claims to the final account. He also thought that the contractors are more bound by the management than what they are. He did understand the contractors concern, and understood that the problem is more likely to occur for younger and more inexperienced personnel. They can be more likely to get off their feet when meeting unexpected situations, and end up sticking to the contract to avoid conflict, and let it accumulate to the end.

5 Discussion

The research questions for this master's thesis is to gather an overview of court cases between public owner and contractors for civil underground projects. This data, together with interviews and literature reviews, are used to assess the cases, and to analyze the contributing factors for these disputes. How to mitigate these factors are discussed at the end.

The results from this study show that all claims ending in a court ruling, involves tens of millions of kroner. It is also evident that contractors on average get less output from the litigation than their original claim. Including all categories, the average output is 38% of the initial claim. If this is caused by the complexity of the disputes, ending with both involved being partly "right"; or if it is caused by an unrealistically high initial claim in order to end on a satisfactory result, is not possible to determine by the findings.

The disputes ending in court have their origin in different parts of the project. The results from the document study and following interviews indicated several underlying factors leading to conflicts evolving into disputes; including the procurement strategy, optimistic bidding, inadequate scheduling, communication problems, and personal issues. These will be discussed in depth in this chapter.

The vast majority of disputes in the industry finds their solution outside of the court, and have not been part of the analyses in this study. These disputes originate from the same conflicts, and have the same characteristics as those ending with a court ruling. This chapter will also discuss why they are solved, and why it is normally preferred to keep disputes out of the court system.

5.1 Dispute Origination

Disputes originate at different parts of the project. If these are not solved, they will grow in size and complexity. As will be discussed in depth later, some disputes are more likely to reach a settlement, but if this is not the case, a resolution will have to be found in the court system. Disputes can develop prior, during and after construction, and will have their distinct characterizations depending on their origin.

Prior

The disputes arising prior to the project, are not related to the construction, but to the tendering process. A contractor feeling cheated of a potential contract, either caused by unlawful tender rejection or tender cancellation, tend to take the case to the court. These disputes are concerning

claims for compensation of lost revenue or remuneration for performed work, and the data shows that they run in the tens of millions. Additionally, these disputes develop from different interpretation of contract documents and laws, so the owner is especially incentivized to formalize any misunderstandings or confusions in a process or contract. This will be further discussed in chapter 5.2.

Furthermore, as these cases originate from contract and law interpretation, a situation develops where a side is either right or wrong, and there is no middle ground to find. This is seen in the result, as these litigations either yield close to nothing or close to the entire claim.

All these factors make it disputes originating prior to construction more likely to end in a court ruling. A larger claim increases the chance of involving a third party and reducing the chance of a successful negotiation. Additionally, as the owner prefer a principal decision from the court instead of a settlement, they are more likely to take the dispute to court.

During

Disagreement will arise in all projects during the construction phase. Disagreement is normally concerning different opinion on who were responsible for cost, quality and time. On their own, these claims are normally too small in size to end in court, but if these are not solved early, it can create a snowball effect, accumulating claims to the final account. This will significantly increase the claims size and complexity, increasing the chance of ending in court.

The unit price contract used in Norwegian underground construction, puts the risk for progress and quality on the contractor, and the owner is responsible for preparing the documents, and to cover the cost of any variations in the bill of quantity. Conflict arise when there is different interpretation of the contract documents, or changes leading to unforeseen knock-on effects. Uncertainties or disagreement on who carried the risk, are the main contributors to conflict.

Any changes or mistakes affecting the progress, can force the contractor to implement mitigation measures to stay on schedule. This is usually followed by a claim for time and financial remuneration. If there are inconsistencies or mistakes in the contract, determining and agreeing upon correct remuneration are problematic, diminishing both co-operation and atmosphere between the parties, increasing the possibility of dispute. The results from the document study show that disputes often develop from these circumstances.

Contract cancellations will also happen at this stage, but this is a rare occurrence. These litigations are concerning law and contract interpretation. These cases are always taken to court, to determine if the cancellation was unlawful. In addition, the claims are large in size, as a contractor will require compensation for lost revenue from the project, as well as compensation for lost future revenue as a result of damaged reputation.

After

Conflicts not solved during the construction, are put off to the final account discussion. Disagreements concerning progress disturbances, document interpretation, breach of condition and work exceeding the variation in quantities set in the contract, are the core issues in most of these disputes. When these claims are handled in the final account, they are no longer isolated incidents, but intertwining with other parts of the project, affecting other processes down the road. It can be difficult to see all dependencies, and for an owner to agree on the contractor's evaluation of the consequences. This situation tends to lead to a third party involvement, and possibly the court system.

In the final account process, it is common to recreate the project in order to justify any claims for remuneration. This exercise has several downsides, and can be a risky process, leading to a deadlocked negotiation. Firstly, this process looks at the project in hindsight. This can put the original claim in an unrealistic light. It is easier to understand how something should have been done, and harder to see the problem from when it arose. Secondly, the reconstructions are prone to include biased documentation, backing up claims in their favor. If this recreation intentionally leaves out information or fabricates documents are speculations.

When disputes drag out in time and complexity, and the involved see no solution in sight, cooperation will degenerate. Atmosphere between the involved will be more hostile, and they will start to safeguard their interests in anticipation of a potential court case.

5.2 Settlements

The representative from NCC assumed that for civil infrastructure projects in general, only 1-3 % of disputes ends with a court ruling. The vast majority of disputes will end in a settlement, either by means of mediation, arbitration, or similar. The number of disputes solved outside the court system is significantly higher than cases ending with a court ruling, and there are several reasons the involved would like to keep the negotiations there. The most important factors are to save time, maintain confidentiality, and that participants are not bound by the same regulations as is set in the courts.

As seen in the results from the studied court cases, it can take significant time to reach a court ruling. The results show that it can take on average of one and a half to two and a half years, depending on which court instance makes the final ruling. During this time, both party will have to invest resources better used on other projects, normally requiring the most experienced people in the company. This results in lost revenue, as key personnel are taken away from their tasks to work on the dispute. Expenses for lawyers and the court is on top of that. Furthermore, the owner

will not make any payment until the ruling is final, which can damage the contractor's liquidity. There is therefore an incentive for all to end the disputes as early as possible, and a resolution outside the court system is preferred by both parties.

Both mediation and arbitration allows for full confidentiality in the negotiations and proceedings, as long as it is agreed upon. This is in most situations preferred, as there are fewer internal restrictions on information that can be presented in the negotiations, which enables an expansion of the argument basis. An additional benefit from a confidentiality clause, is that it prevents the case from reaching the public. A company associated with a high level of conflict, is to be avoided by all cost, and is a major driving force for keeping a dispute out of the courts.

In general, it is preferred to be able to work in a framework set by the involved, and it will be an important factor for staying outside of the court system. Mediation with lawyers are most used in Norway for this purpose, as it is not bound by the same rules as the court, and the involved have more freedom to facilitate the discussions. In contrast to arbitration, a third part cannot force a solution, so the involved have to agree on a final outcome. Both parties are also able to back out at any time, if they are not able to find common ground. The latter will normally lead the case to the court system.

The downside of working outside the court system is that any legal development made in the dispute is lost. A final ruling in the arbitration court that are confidential, is not made public, and cannot be used in future, similar cases. Therefore, it will not contribute to legal development in the field.

No legal development can in some instances be preferable, as any changes in law interpretation can inflict changes on the construction process, leading to more work. A clarification in the ruling practice can also lead to future changes in risk allocation between owner and contractor. Any changes from status quo will always meet opposition from the losing party.

A clarification and legal development can also be sought after by the involved. It can result in faster dispute resolution in the future, which is advantageous for all parties, as resources will be freed up and liquidity problems reduced. Additionally, clarification on the procurement laws are of utmost importance. An unlawful tender disqualification, can cost the owner hundreds of millions in remuneration, or prevent contractors from engaging the workers. A clear interpretation of the contracts is therefore vital to all involved.

As argued above, it is usually preferable to solve a dispute outside the court system, and it is easier to achieve this for disputes not involving law interpretation. Claims and conflict from the final account are more inclined to find a resolution there compared to litigations concerning the tender

process. Final account disputes are generally related to progress disturbances and document interpretation, and knock-on effects related to this. It can be difficult to determine the correct causation of events, and to see the dependencies. They will also involve biased documentation and views, are prone to hindsight, and are intertwined with other events of the project. It can therefore be difficult to determine who is correct, as there is no clear answer, and it cannot be determined by interpreting the law. As it is preferable to keep the dispute outside the court system, these parties are more likely to reach a settlement where both parties can be reasonably content with the outcome.

Disputes regarding the tender process or contract cancellation will in contrast to the final account depend on law and contract interpretation, and will in most cases only be solved in court. These cases are large in size and originate from ambiguities and misinterpretation of contract documents. The outcome is largely based on who interpreted the documents correctly, which result in a definitive ruling to one side.

Smaller projects are rarely seen in the court system, according to the interviewees. They point to several factors. For one, the complexity of the projects is usually not at a high level, and documents are less susceptible for mistakes or misinterpretations. Secondly, the disputes are regarding smaller amounts, and the possible benefit might be too low. There are significant costs and time related to going to court. In addition, improved relations with the owner can be more beneficial than an eventual payment after going to court.

Smaller contractors are for the same reasons as above less likely to end in court. Furthermore, they might not have the resources required for doing so, as the liquidity can be damaged in the time it takes to reach a court ruling.

5.3 Main Factors for Disputes

The research indicates that most disputes ending with a court ruling originate from either inadequate or misinterpreted tender documentation; or as a result of progress disturbances, with unforeseen knock-on effects. In these cases, the involved have different goals that can cause conflict. The contractor benefits from asserting that the change order is not covered by the contract, such that the owner carries the risk. The owner will on the other hand ascribe as much as possible to the contract, such that any change affects them as little as possible.

The results from this study points to five main factors as contributors to the high dispute level in public underground infrastructure projects:

- Procurement strategy
- Optimistic bidding
- Scheduling

- Communication
- Personal issues

5.3.1 Procurement Strategy

The major issue is the tender process used for complex underground projects. The traditional procurement strategy used in tunneling projects has been design-bid-build (DBB). This process separates the project in three sequential phases, illustrated in figure 11. First, a design phase where the tender documents are prepared. The public subsidiary organizations have some resources to do the design, but in most projects, a consultant firm is hired to prepare construction drawings and technical specifications. Then there is a bidding phase, where contractors prepare bids based on the tender documents. Selection is done based on lowest price. Lastly is the construction phase, where contractors are normally bound by the unit price contract. As of 2015, 95% of the Public Road Administrations turnover for civil engineering projects were based on this contract strategy (Statens vegvesen, 2015). The majority of underground projects in Norway are owner by this organization, and the numbers are representative for the actual situation in the industry.

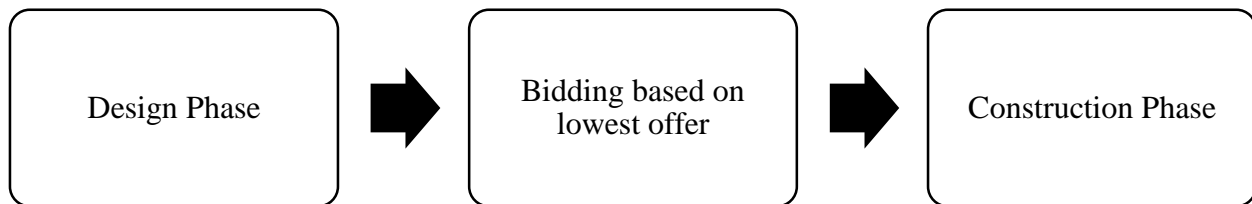


Figure 11: The traditional procurement strategy

As the bidding and subsequent construction depends on the tender documentation, it is vital that these are as clear and correct as possible. The results from the document study show that a large percentage of disputes ending in court, are based on either different document interpretation or mistakes, leading to changes in the construction phase. This insinuates that the tender documents do not hold an adequate standard.

It is close to impossible to anticipate all variations and occurrences that could happen in a project, but mistakes appear to be too frequent. Any mistakes, incomplete, or missing items from the design phase, will require a change order in the construction phase. According to the interviewed contractors, there is a consensus that consultants are not held accountable for mistakes, and any claims for remuneration on mitigation measures are rejected on the basis of “you should have understood”. This might be the case, but with a selection based on lowest price (discussed further

below), any contingency to meet the uncertainty can make their offer too expensive, which can lead the contractor to ignore it. When no side takes responsibility for mistakes, it is close to impossible to reach a resolution, and the claim usually ends up in the final account.

It has also been stated that the owner tends to side more with the consultant than the contractor. A reason for this can be the late involvement of the contractor, and the others feel a stronger coherence with the projects, as they have usually been working on it for a long time. Any potential conflict between owner and consultants are not discussed in this thesis, but their contracts are smaller, resulting in smaller claims.

There are a few potential downsides by using lowest price as the only award criteria. As an example, when there are lean times for a contractor or a pressed market, contractors can give bids with reduced contingencies for risk or assume an unrealistic production in order to be selected. This can potentially be dangerous for both parties, as changes or unforeseen event can cause time overruns or reduced quality. This leads to claims from both sides, increasing the possibility of serious disputes. In a worst case scenario, it can lead to bankruptcy. Optimistic bidding will be discussed further in chapter 5.3.2.

Another potential problem is tactical pricing in the bid. There are several approaches used in the term tactical pricing. One potential method is to price early work in the projects high, and compensate with lower costs at work in the end of the project. This ensures a higher liquidity for the contractor at the beginning of the project. This can potentially weaken the owners position if the quality is not satisfactory, as the owner loose a strong hand in case of disputes. Bad liquidity will on the other put financial strain on the contractor, and force them to push for compensation on other processes, leading to more disputes. This can be difficult to balance.

Another potential approach is for the contractor to intentionally price items wrong or exploits mistakes or uncertainties in the contract specification. This usually means that the contractor is not distributing cost and profit evenly, such that some items in the bill of quantity (BoQ) is priced cheap and some expensive compared to the actual costs. They might then argue to implement the expensive items more often, potentially causing conflict.

A third consideration with the bidding process, is that award criteria based on lowest price will often rule out any form of alternative solutions to be presented by the contractors. The contracts and specification codes lack the possibility to allow for new ideas. A better and more sustainable solution can then be overlooked, which could possibly save a lot of money. Alternative solutions can in some cases qualify for disqualification.

One of the main advantages with selection based on lowest price, will be the possibility to select the contractor on objective terms. Any personal feelings or other associations are not taken into

consideration. Furthermore, the lowest bid criterion will ascribe much of the risk to the contractor, which can be advantageous for the owner. It can also be argued that budget control is easier.

The results from the document study does not imply that the unit price contract form is the cause of conflict. None of the interviewees stated any major concern with the contract. They are balanced templates to share the risk between the contractor and owner, based on standard agreements.

The main issue with the contract, will be a changing market. The unit price contract is dependent on correct tender documents. The prices given in a tender bid are based on the BoQ, and that the processes described are correct. Any major deviation from this will cause disputes over risk allocation, knock-on effects, payment etc. Over the past few years, there has been an increase in high value projects, which is both more expensive and complex. Increased complexity escalates the chance of missing important processes or other mistakes in the BoQ, leading to disputes. All interviewees have stated a concern with an increase of mistakes in the contract documents, leading to changes and cost overruns, which is a factor in the current conflict level.

5.3.2 Optimistic Bids

As stated in the introduction, there is a record production in underground contracts, but also a more pressed market. There is a high competition for the projects, and the procurement method are a contributor for tough competitive bidding. Contractors are disposed to price optimistically, with low contingencies and optimistic process times, in order to win the contract.

An optimistic bid can be the result of a deliberate tactical bid or as a result of cognitive reasons. If it is the result of the former, there is some disagreement in the industry if this should be tolerated. It can be difficult to determine if it is done to exploit ambiguities in the documents, or to position the company in the market. The opinions differ between the interviewees. Some state that it is part of the business to exploit every financial opportunity, while other sees it as a necessary evil. In any case, it can be argued that it should be allowed as long as the contractor is willing to accept the risk that follows the bid. The main problem occurs if the project ends over budget. This results in claims for remuneration in other parts, in order to make up for the budget loss.

Another possible explanation for the optimistic bids can be cognitive reasons. People have a tendency to underestimate work load and overestimate own capabilities. This was among others shown by Kahneman and Tversky in 1979, in a study of decision under risk. Their findings suggest that people underweight outcomes that are less probable compared to outcomes that are more likely, which can have a direct effect on cost and time estimation in projects. There can be a tendency to underestimate risk, and to assign insufficient contingencies. It can also prevent good logistic flow and resource allocation, and allowing for insufficient slack in the schedules.

5.3.3 Scheduling

According to the unit price contracts used in Norwegian underground projects, the contractor is responsible for construction progress and to build after technical specifications, and are responsible for any risk related to this. The results from this study indicate that the majority of disputes are concerning construction progress and related compensation for progress disturbances. The underlying reason are usually faulty tender documents, but the projects schedule is also an important factor.

Project schedules are an important tool to control and plan a project, showing planned work activities for the projects. It is used as a basis for budget control, to plan resource allocation of staff and equipment, and to show dependencies between work activities. Larger and more complex projects will have equivalent complex schedules. When actual progress exceeds planned progress, there will usually be a dispute on which party were responsible and who carried the risk, and a following claim for additional construction time or remuneration from the contractor.

The owner's representative interviewed in this study, stated a lack of efficient and correct planning from the contractors as a major contributor to the dispute level. The contractors planning is not adequate to considering all dependencies in a project, which results in unforeseen knock-on effects. When a change appears in the project, it will then be much harder to discover and see all the consequences, and the change remuneration claim will not contain all related costs. When the knock-on effects are discovered later in the project, an additional claim can appear, and it can be harder to accept as it is not directly clear what caused the disturbance.

It is especially difficult to solve disputes regarding unforeseen consequences of an event, caused by either inadequate planning or risk management. For both owner and contractor to agree on causality and rational work, requires all involved to interpret the consequences the same way. Biased views on what is rational work, budget requirements and profit margins to consider, and different views on contingency measures; makes this close to impossible to achieve. Furthermore, when this is seen in hindsight, it can be difficult for the owner to agree on the contractor's actions. This was stated by the contractor's interviewees as the main issue on the subject.

There was also raised a concern during the interviews that contractors intentionally left the schedule undetailed, to be able to adjust the dependencies if the progress is slower than expected, and be able to present the critical path at another part of the project. It can also be argued that the contract documents are prone to error, which in turn justifies why the schedule is left with a lot of slack.

Tedd Årnes in Veidekke stated a concern about reduced construction time. In addition to shorter planning periods, there are less time available to incorporate slack in critical activities. If anything

unexpected occur, there is less time to make up for it, and increased chance for time overruns. On the other hand, too much time for the contractor can result in reduced productivity, as they might invest their resources on other, more pressed projects. There is also the possibility that they do other work in the meantime, eventually ending up with short construction time anyways.

If there are no focus on dependencies and slack when making the schedule, there is a higher risk for time overruns or delays to occur in the projects. Time overruns will lead to claims from the contractors for time extension or remuneration, as they are risk averse. Additionally, a good schedule can clarify dependencies and knock-on effects more easily, and give a clearer view of the project. This can significantly decrease time spent arguing about the consequences, and be a good documentation to back up claims, preventing disputes.

5.3.4 Communication

Underground construction includes many parties and people, and good communication is vital to achieve a successful project. Good communication is essential to uncover misunderstandings, secure good co-operation, as well as to be able to solve problems fast. The conflict level in the industry can indicate that the communication is not at the desired level. It is important to identify the reasons for the communication problems.

Mitkus and Mitkus (2014) argued in their paper on causes of conflicts in the construction industry, that the main cause of conflict is unsuccessful communication. They conclude that any contract allowing for subjective interpretations constitutes the main cause of conflict. If there are no clear guidelines on risk allocation, there will likely occur communicational problems between the contracting parties. As an example, a change can lead to the contractor claiming compensation for any additional work performed, while the owner's opinion is that the risk was at the contractor, and that he should carry the expense.

The DBB strategy used in the procurement will implicitly mean that all communication between contractor and consultant happen through the owner. This is required, as the owner have administrative responsibilities for the project, but can results in long communication line. If this results in clarification problems, it can affect the schedule and create knock-on effects. The contractor can also result to mitigation measures to keep up with progress, which the owner does not agree with. This results in discussions, and can cause disputes. Additionally, time consuming communication can be frustrating for the involved, and deteriorate the relationship.

Documentation is an integral part of the communication between owner, consultant and contractor. A complicated process or a lack of awareness on document handling will delay communication and create frustration. Interviewees stated that the amount of documentation is too high. Too much documentation is time consuming, and combined with shorter construction time, it is more likely for the project to end behind schedule. Documentation will on the other hand be important in the final account, to determine what work was actually performed, and to back up potential claims.

The involved in a project will normally have biased attitude towards risk and different views on the consequences of delays. If risk allocation is not communicated effectively, or not clearly defined in the contract, misunderstandings and conflict might arise.

Good communication is essential for creating good relationships and co-operation between the involved parties in a project. Fast and efficient communication can help to reduce conflicts, by preventing misunderstandings and to solve problems earlier. Fast communication with thorough documentation can also aid in finding an objective solution which works better for both parties, and prevent the situation to be assessed in hindsight.

5.3.5 Personal Issues

Decisions taken in the projects will never be completely objective, even though the award criterion on lowest price tries to compensate for this. The project organization for all involved will include different people on all levels, and at the end, several personal factors affects decision making in a project. Personal issues will also affect how conflicts and disputes are handled.

Several other aspects can also be important factors in the relationship between the contracting parties. Past history, interpersonal skills, experience, responsibility structure, and management are all factors that can affect the atmosphere between the owner and contractor. Former research (e.g. Diekmann & Girard, 1995) have concluded that the people in the projects are the key to avoid disputes.

All interviewees stated great concern about the decision making for project participants, but with different viewpoints. Both the contractor's representatives pointed to a lack of authorization on the owner's side to approve claims as a they arise. Any major decisions have a tendency to be postponed to the final account, where there is an increased chance of disputes ending in court. The owner's representative stated the opposite, and felt the same problem was at the contractor's end.

The problem of authorization can possible happen on both sides of a contract. An unexperienced project organization can be less comfortable accepting claims that might affect budget or schedule,

thus preferring to postpone the decision to the final account. An organization where responsibilities are unclearly defined or where it is unclear who has the authority to make decisions, will meet the same problems.

Past working history between owner and contractor can affect the relationship both ways. If past history has been difficult and conflicting, any expectation for good co-operation might be starting off on the wrong foot. If there is no trust between the contracting parties, co-operation can deteriorate, and the focus can end on strengthening their own position in anticipation for disputes, worsening the atmosphere. A good relationship can on the other hand strengthen co-operation, as they know they are fairly treated.

The people in organizations are equally important, as interpersonal skills play an important role in negotiations and co-operation. Either if these are inherent or trained, good personal skills improve relationship and trust between the parties. The ability to understand the other sides views are an essential personal trait, and are vital for good co-operation and to decrease dispute levels. If each side understands the other party's interests and goals, it is easier to find solutions all involved can benefit from. Increased understanding can also make the project more predictable, reducing the potential for disagreement.

5.4 Dispute Mitigation

As discussed in this chapter, disputes ending with a court case originate from two sources. Firstly, the contractual basis can be misleading or faulty. Improving this will have an impact on the dispute level. Secondly, conflicts and disagreements remain unsolved in the project, deteriorating relationships and complicating disputes. They have to be solved early to prevent litigations.

The procurement strategy, contractor's optimistic bids, their scheduling, communication between the project participants, and personal issues are all factors that have to be addressed to reduce the dispute level in the underground construction industry.

There are two mitigation factors identified that could reduce the number of court cases. Earlier involvement of the contractor can aid in reducing mistakes in the tender documentation, as well as to create more realistic schedules and bids. It could also improve communication and to alleviate personal issues. Secondly, there seem to be a problem of solving disputes early. Any method allowing for this could keep the final account disputes to a minimum, drastically reducing the possibility for taking a claim to the court system.

5.4.1 Earlier Involvement

There are two main issues to be addressed in the procurement strategy used today. The design and tender process are separate and sequential, so the bidding are dependent on the tender documents and technical specifications. These are prone to be incomplete, incorrect or missing important processes, causing a large amount of change orders. Furthermore, the documents can be unclear or misleading, increasing the chance of misunderstanding between the involved. This is a major contributor to the dispute level in the industry. Secondly, the award criterion used is in a large extent based on lowest price. This can improve budget control and secure an objective selection, but the accuracy of the price is dependent on thorough, correct and clear tender documents. The practice can also prevent smarter solutions, reducing quality and increasing cost in the long run.

The problems mentioned above can be addressed by an earlier involvement of the contractor. According to research, early involvement have three main advantages for the projects; it can contribute to better relationship between the parties, decrease the possibility of a hostile relationship, and increase the project understanding (Lingguang et al., 2009). There exist several different approaches for early involvement of contractor, but these will not be discussed in this thesis.

An early involvement can facilitate a better relationship between owner, contractor and consultant. By involving the contractors early in the process, they will get a better sense of ownership over the projects, which can decrease the possibility for an adversarial relationship. An early involvement of the contractor might also expose mistakes or incomplete processes at an early stage, avoiding possible future conflicts. Any misunderstandings or difference in communication can also be addressed earlier, before construction has started, resulting in similar perception of the project by all involved. Any major uncertainties, which could have resulted in large contingencies or possible budget overruns, will also be addressed.

Early involvement allows for the contractors to use their experience and construction knowledge in the front-end of the project. By letting contractors use their experience on influencing technical solutions, there is an increased chance of finding a better and more sustainable construction approach, saving both time and money. Earlier involvement will also, as long as the involved participate, lead to a deeper and more thorough understanding of the project. This can help in the planning phase, clarifying dependencies, and resulting in an improved project schedule.

Other award criterions than lowest bid need to be used when involving contractors in the front-end of the project. The contractors can be evaluated on other aspects such as; organization, planning, technical solutions, SHA, competence, communication etc. All these factors can contribute to the co-operation between owner and contractor, which is an important factor to reduce disputes. The bid price will have less impact on the selection of the contractor. An early involvement with good

communication in the process, can also reveal mistakes or misinterpretations early, which would otherwise have led to disqualification of the tender bid.

Involving a contractor early have some challenges to address, and important factors to take into considerations. First and most important, the process is both time and resource consuming for the contractor. Depending on the scale and complexity of the project, a contractor will have to use a project group over an extended period of time to work on a project, which might not yield any financial result if they do not win. Without any compensation for performed work, the process can be unappealing. Since the process is so time consuming, that there is no capacity to implement this on all projects, and the DBB approach will still be dominating. Additionally, there are still not much experience from either side with this procurement strategy.

The other major concern is how to insure an objective selection process when contractors are evaluated on other aspects than lowest price. These award criteria can be difficult to quantify, and it will be prone to subjective decisions. How to evaluate the different contractors on the award criteria is still up for debate at this time. Since all contractors operate relatively similar, and works in the same way, a concern with this method are the possibility of all bidder are evaluated similarly on the award criterions. If this is the case, the price will be the decisive factor after all.

For early involvement of the contractor in public infrastructure projects to be a success, several factors have to be addressed. These factors will not be discussed further in this thesis, but Wondimu et al. (2016) presents them in greater detail in the paper “Success factors for early contractor involvement (ECI) in public infrastructure projects”. They identified the following factors:

- Involve contractors early enough.
- Manageable risk transfer to the contractors.
- Project owners’ competence.
- Proper compensation for the contractors’ contribution.
- Qualification of the contractor.
- Trust between the owner and the contractor.

5.4.2 Conflict Resolution Techniques

As is shown in this thesis, a large percentage of court cases are regarding disputes which have accumulated in size and complexity to the final account. These disputes have a higher chance of ending in the court system. Most of the larger infrastructure projects will have a clause for arbitration, but this only acts as an alternative to court. It would be beneficial if the disputes were

solved before reaching this stage. Solving conflicts and disagreements as they occur is the key to prevent them from escalating, and in worst case, ending with litigation.

There exist several concepts for disputes resolution during the project. “Project neutral”, “standing neutral”, “dispute review board” (DRB), “project integrated mediation” (PRIME), “standing arbitrator”, and “standing mediator” are all concepts essentially involving the same elements and goals (Hafer, 2010). All these methods aim to include one or more independent and neutral industry professional, which is part of the project from day one, keeps continuous contact with the parties, and assist in any eventual disputes. The idea with the concepts are to assist the parties in a construction project with both preventing and resolving disputes that might occur.

The PRIME concept has been used for a few years in Norway, and the Public Road Administration was the first to implement this in the industry. It is a fairly new concept, and as of this time, it has only been used on a few projects. The industry is still getting acquainted with the concept, but there has been positive feedback (Kaasen, 2012). Internationally, the concepts have been around for longer, and are more thoroughly documented. It has proven very successful in the US, significantly reducing construction disputes (Hafer, 2010).

When using one of the concepts mentioned above, there are two concerns that needs to be addressed. Firstly, it is crucial to determine if the mediators are there to assist in the dispute resolution, or to decide on a binding resolution. Secondly, there are no guaranty that the mediators will select the best or most suitable solution, and they can have biased views. The latter is addressed as both parties have to agree on the mediators.

All the dispute prevention concepts mentioned above entails extra expenses and resources for the project. In addition to the direct coast of having industry professionals linked to the project, it requires time and effort from the project parties. This raise the question of how many mediators are needed and how often they are required to meet.

In Norway, it has been normal to have either one or three mediators (Kaasen, 2012). More mediators can allow for greater dynamic and reflection in the mediation, and can create a larger knowledge base than only having one. The cost aspect is obviously an important factor as well, and will normally be the decisive one. Larger and more complicated projects can benefit from three mediators, and the cost will be less decisive. More mediators are also an option, but more than three can be too expensive and inefficient, and two mediators can cause problems if they have different opinions.

In any occasion, there are no doubt that a dispute prevention concept could be an inexpensive “insurance” for the involved against litigation. The cost and time required are far lower than possible expenses related to court or arbitration.

6 Conclusion & Recommendations

The conclusions are based on the results and discussions in chapter 4 and 5. The research goals addressed in this thesis were as follows:

- Collect information on disputes ending in a court ruling for recently completed Norwegian underground projects. Collect data by document studies, interviews and former research on disputes between public owner and contractor.
- Identify what types of disputes ends in the court system, and identify underlying factors and causes for this.
- Identify and suggest mitigation measures to limit the above mentioned factors and causes.

6.1 Main Findings & Recommendations

The findings in this study indicates that disputes ending in the court system originate from two causes. Firstly, ambiguous or misleading tender and contract documentation can cause litigations based on a wrongful tender process or contract cancellation. Faulty or misinterpreted documents will additionally lead to more change orders, which can cause disagreements between the parties. Secondly, conflicts and claims regarding progress disturbances are not solved during construction, and accumulate to larger and more complicated disputes in the final account.

The research concludes that there are five main underlying factors, contributing to dispute origination, and why they are not solved.

The procurement strategy most commonly used for underground projects prohibits contractors from getting involved in the planning phase. This limits the possibility of uncovering misunderstandings, misinterpretations, and different goals at an early stage, before they affect the project. It can also limit the contractor's affiliation and knowledge of the project.

There is a tough market, and most award criteria is based on lowest bid. The contractors have a tendency to deliver optimistic bids with low contingencies, either caused by cognitive biases or to win the bid. In any case, there are a lower profit margin, and there are less contingencies to handle changes.

The schedules are not prepared well enough to uncover dependencies in the projects. This result in unforeseen knock-on effect and claims that are difficult to agree upon. Additionally, they

incorporate too little slack in critical or risky activities, either caused by limited construction time or for tactical reasons.

The communication between the involved parties in a project is a factor for the dispute level. Inadequate communication reduces the possibility for a conflict to be solved fast, and for misunderstandings to be clarified promptly.

There seems to be a lack of clear responsibility and authorization on both sides of disputes, limiting the possibility of solving problems as they appear. This vary from project to project, and are dependent on the people in the organizations.

Earlier involvement of the contractor can be a great contributor to reducing the dispute level. It is time consuming and costly, but can be valuable for uncovering misunderstandings and misconception before they become an issue. Additionally, it can give the contractors a deeper understanding and coherency to the project, improving relation and communication with consultant and owner. The deeper understanding can also aid in preparing more realistic bids and schedules. Despite increased cost and time, early involvement of the contractor can be a good investment in large and complicated projects.

Imposing conflict resolution techniques, e.g. PRIME or DRB, can be an inexpensive insurance, and help solve disputes at an early stage. This can prevent disputes from accumulating to larger and more complex claims in the final account.

6.2 Further Work

The following proposals are put forward for future work on the subject. Some of the work is already in progress:

- Study the data from disputes ending with a settlement from mediation or arbitration. These comprise a large part of the disputes in the industry.
- Extend the work to include all infrastructure projects, not just underground work. The same problems occur in the industry.
- Study how earlier involvement of contractor and conflict resolution techniques affect the dispute level. These have been implemented on a few projects as of today, but further research is needed to document the effects.
- Investigate the dispute level between contractors and sub-contractors. There are indications that there is just as high dispute level between these parties, but the economical claims are lower.

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Court Cases

Mesta Drift AS v. Samferdselsdepartementet [2009] 08-052830ASD-ALAG (Agder lagmannsrett)

Mesta Entreprenør AS v. Staten v/Samferdselsdepartementet [2011] TOSLO-2010-195161 (Oslo tingrett)

Mika AS v. Staten v/Samferdselsdepartementet [2013] LB-2011-135964 (Borgarting lagmannsrett)

NCC Construction AS v. Staten v/Samferdselsdepartementet [2013] 10-191253TVI-OTIR/04 (Oslo tingrett)

NCC Construction AS v. Sogn og Fjordane fylkeskommune [2013] TFJOR-2012-51372 (Fjordane tingrett)

Staten v/Samferdselsdepartementet v. Skanska Norge AS [2013] LB-2012-36777 (Borgarting lagmannsrett)

Samferdselsdepartementet v. Mesta Drift AS [2013] 12-070134ASD-BORG/03 (Borgarting lagmannsrett)

Veidekke Entreprenør AS v. Staten v/Samferdselsdepartementet [2013] LB-2012-205647 (Borgarting lagmannsrett)

Mika AS v. Staten v/Samferdselsdepartementet [2014] LG-2012-67156 (Gulating lagmannsrett)

Leonhard Nilsen & Sønner AS v. Staten v/Samferdselsdepartementet [2015] 13-089196TVI-SALT (Salten tingrett)

Skanska Norge AS v. Staten v/Samferdselsdepartementet [2015] 13-200343TVI-NOVE (Nordre Vestfold tingrett)

Veidekke Entreprenør AS v. Staten v/Samferdselsdepartementet v/Jernbaneverket [2015] 15-007059TVI-NETE (Nedre Telemark tingrett)

OBRAS Subterraneas S.A v. Staten v/Samferdselsdepartementet [2017] Ikke rettskraftig (Nord-Troms tingrett)

Skanska Norge AS v. Bane NOR Sf [2017] Ikke rettskraftig (Oslo tingrett)

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Appendix A

Overview of court cases

	Case name	Court name Case Number	Date From-To	Reason for litigation
1	<i>Mesta Drift AS</i> v. <i>Samferdselsdepartementet</i>	Agder lagmannsrett 08-052830ASD-ALAG	06.03.2007 22.01.2009	Remuneration, Schedule change
2	<i>Mesta Entreprenør AS</i> v. <i>Samferdselsdepartementet</i>	Oslo tingrett TOSLO-2010-195161	03.12.2010 21.09.2011	Cancelled tender
3	<i>NCC Construction AS</i> v. <i>Samferdselsdepartementet</i>	Oslo tingrett 10-191253TVI- OTIR/04	26.11.2010 07.02.2013	Acquisition, Tender selection
4	<i>Mika AS</i> v. <i>Samferdselsdepartementet</i>	Borgarting lagmannsrett LB-2011-135964	22.03.2011 25.02.2013	Remuneration, Schedule change
5	<i>Veidekke Entreprenør AS</i> v. <i>Samferdselsdepartementet</i>	Borgarting lagmannsrett LB-2012-205647	31.01.2012 28.06.2013	Document interpretation
6	<i>NCC Construction AS</i> v. <i>S&F Fylkeskommune</i>	Fjordane tingrett TFJOR-2012-51372	21.03.2012 31.07.2013	Remuneration, Schedule change
7	<i>Samferdselsdepartementet</i> v. <i>Skanska Norge AS</i>	Borgarting lagmannsrett LB-2012-36777	28.01.2011 28.10.2013	Acquisition, Tender selection
8	<i>Samferdselsdepartementet</i> v. <i>Mesta Drift AS</i>	Borgarting lagmannsrett 12-070134ASD- BORG/03	28.10.2009 18.11.2013	Document interpretation
9	<i>Mika AS</i> v. <i>Samferdselsdepartementet</i>	Gulating lagmannsrett LG-2012-67156	31.11.2010 21.03.2014	Delays, Schedule change
10	<i>Skanska Norge AS</i> v. <i>Samferdselsdepartementet</i>	Nordre Vestfold tingrett 13-200343TVI-NOVE	02.12.2013 15.05.2015	Remuneration, Schedule change, Delays
11	<i>LNS</i> v. <i>Samferdselsdepartementet</i>	Salten tingrett 13-089196TVI-SALT	27.05.2013 13.08.2015	Change of scope, Schedule change
12	<i>Veidekke Entreprenør AS</i> v. <i>Samferdselsdepartementet</i>	Nedre Telemark tingrett 15-007059TVI-NETE	13.01.2015 30.12.2015	Document interpretation
13	<i>OSSA</i> v. <i>Samferdselsdepartementet</i>	Nord-Troms tingrett 15-195758TVI-NHER	09.03.2016 16.01.2017	Contract cancellation
14	<i>Skanska Norge AS</i> v. <i>Samferdselsdepartementet</i>	Oslo tingrett TOSLO-2016-67346	21.04.2016 17.03.2017	Acquisition, Tender selection

	Contractor Initial Claim [NOK]	Owner Initial Claim [NOK]	Paid to Contractor Legal cost [NOK]	Paid to Owner Legal cost [NOK]	Notes
1	54,141,310.00	Acquitted	37,277,746 0	0 0	Rock quality
2	51,600,000.00	Acquitted	880,000.00 0	0 0	
3	75,099,175.00	Acquitted	0 0	0 117,090.00	
4	105,000,000.00	Acquitted	160,000.00 0	0 1,804,048.57	Appeal rejected
5	7,603,115.00	Acquitted	290,950.00 0	0 285,040.00	Appeal rejected
6	78,986,023.00	Acquitted	38,340,353.00 0	0 0	
7	58,500,000.00	Acquitted	56,000,000 919,285.00	0 0	Appeal to the Supreme Court rejected
8	60,592,274.00	Acquitted	23,177,744.00 0	0 0	
9	37,087,252.00	Acquitted	10,595,500.00 0	0 0	Rock quality
10	62,666,272.00	Acquitted	6,250,000.00 0	0 3,276,967	
11	55,000,000.00	38,287,161.00	5,598,072.00 0	3,400,000 0	
12	59,009,690.00	Acquitted	50,283,816.00 238,227.00	0 0	
13	383,912,995.00	84,355,128.00	0 0	78,835,439.00 0	Case is appealed
14	305,378,109.00	Acquitted	305,378,109.00 1,577,301.00	0 0	Case is appealed

Appendix B

Interview guides

(In Norwegian)

Intervjuguide – Anders Haukedalen (NCC) & Tedd Årnes (Veidekke)

1. Hvordan er konfliktsituasjonen i bransjen i dag

- a. Hvordan har utviklingen av tvister vært de siste årene?
- b. Bidrar økt konkurranse til å øke antall tvister? Taktisk prising.
- c. Forventes det at det blir tvister i prosjekter?

2. Hva tenker du er årsaken til konflikter?

- a. Hvorfor oppstår det konflikter/hvorfor løses de ikke? (Sier «nei» til alle krav, enkeltpersoner og ikke kontrakter. Entreprenørene også vanskeligere pga. markedet.)
- b. Undervurderer/neglisjerer entreprenører risiko for å få jobben?
- c. Hvorfor ender noen tvister i retten? Hvilke typer tvister?

3. Løsninger

- a. Hvilke arbeid gjøres i dag for å redusere tvister? KLR? Hvordan fungerer det?
- b. Hva tenker dere kan bidra til å redusere antall tvister i framtiden?
- c. Fokus på lavest pris et problem?

4. Arbeid tilknyttet rettsaken

- a. Hvor mye ressurser kreves vanligvis i arbeid med tvister?
- b. Hvor lang tid tar det å komme fram til en løsning?
- c. Får entreprenører vanligvis tilkjent kravet? Hvor stor prosent er vanlig? Vil man vinne på å gå til rettsak, får man mer enn hvis man ikke gjør det?

5. Annet?

Intervjuguide – Harald Inge Johnsen (Statens Vegvesen)

1. Hvordan er konfliktsituasjonen i bransjen i dag?

- a. Hvordan er konfliktsituasjonen i dag og hvordan har den forandret seg de siste årene?
- b. Forventes det at prosjekter ender med tvister?
- c. Hvorfor havner prosjekter i retten (istedenfor å løses på et lavere nivå)?

2. Årsaken til tvistene?

- a. Hva tenker du er årsakene til at det oppstår uenigheter?
- b. Øker antall tvister med størrelsen på prosjektene?
- c. Entreprenører har ytret meninger om at det ikke finnes tilstrekkelig myndighet hos prosjektleder til å løse tvister underveis, som samles i sluttoppgjøret. Hvordan stiller du deg til det?

3. Løsninger?

- a. Hvordan arbeider dere for å redusere tvister i prosjektene nå?
- b. Hva tenker dere kan gjøres framover?

4. Kostnader & prosess tilknyttet tvister?

- a. Har dere oversikt over antall tvister og ekstrakostnader tilknyttet dette?
- b. Vil dere anke automatisk til en høyere rettsinstans dersom dere ikke er fornøyd med utfallet?
- c. Hvor mye ressurser kreves i en typisk tvistesak?

5. Annet?

Appendix C

Inquiry to the courts

(In Norwegian)

Inquiry to the courts

Hei!

Jeg jobber for tiden med min masteroppgave ved NTNU, med tittel "Overview and analysis of court cases related to Norwegian underground construction". Som en del av forskningen skal jeg analysere dommer mellom statlige byggherrer og entreprenører de siste 10 årene.

Jeg har forstått det slik at for å hente ut dommer må jeg kontakte domstolen som hadde saken og kunne identifisere dommen. Vil det være mulig for dere å sende meg dommer fra Øst-Finnmark tingrett som har vært mellom overnevnte parter? Jeg ønsker også saker som endte i forlik. Jeg er kun på jakt etter dommer tilknyttet tunnelbygging, så det er kun et fåtall per år. Det hadde vært til veldig stor hjelp, og alle ved NTNU hadde satt stor pris på om dere kunne bidra til forskningen.

Sakene jeg er på jakt etter er mellom Samferdselsdepartementet (enten for Statens vegvesen eller Jernbaneverket) og forskjellige entreprenører (Veidekke, Implenia, Skanska, AF-gruppen, NCC, LNS, Kruse Smith, Marti, OSSA, Mika AS og Hæhre)