NTNU

Norwegian University of
Science and Technology

Are there asymmetric power relations in a product development project involving small enterprises and large R&D-institutions?

A case study in influence and dependency in R&D-collaborations

Lars Gjølme

Fredric Staksrud Hansen

NTNU School of Entrepreneurship
Submission date: December 2015
Supervisor: Ola Edvin Vie, IØT

Norwegian University of Science and Technology
Department of Industrial Economics and Technology Management

Preface

This thesis is written by two students at NTNU's School of Entrepreneurship, a Master Programme at the Norwegian University of Science and Technology (NTNU). Both students are entrepreneurs in their own separate small enterprises. The thesis is the master assignment of the subject "TIØ4945 - Innovasjon og entreprenørskap, Masteroppgave". The purpose of this thesis is to investigate if there is power asymmetry in an R&D-collaboration between a small enterprise and a research institution, where the collaboration goal is product development for the small enterprises as principal with the research institution as agent. This thesis will examine if power asymmetries influences the R&D-process and if one can make recommendations for similar collaborations. To prepare for researching the subject, a literature review was conducted during the autumn of 2014, which served as the project assignment in "TIØ4530 - Innovation and Entrepreneurship." The authors have also prepared for this thesis through a term paper in "TIØ4535 - Small enterprises, Specialization Course.

The authors wishes especially to thank their supervisor, Associate Professor Ola Edvin Vie, for his patience, insightful feedback and valuable recommendations during the autumn of 2014, and the entire year of 2015. His theoretical and methodological insight has been an inspiration and crucial contribution to the progress and direction of the work.

The authors are grateful for the respondents participating with information and their experience with R&D-collaborations and process.

Gjølme and Staksrud Hansen also wish to express gratitude towards SINTEF for introducing the respondents to us.

Abstract

The objective of this thesis is to answer the main research question: “Can we observe the existence of power imbalance in R&D-collaboration, and how is this power imbalance formed by dependency and influence?” The main research question is separated into three subordinated research questions; (1) can we identify an asymmetric power balance between research institutions and small enterprises? (2) How is the power distribution between the research institution and customer company in relation to influence? (3) To which degree is the small enterprise dependent on the research institution, and how can the small enterprise obtain a level of dependency that optimizes the value of the collaboration?

The approach is a descriptive case study of four separate R&D-projects involving SINTEF and one small company. The empirical data is gathered from ten individual interviews with representatives from SINTEF and representatives from their customers. The theoretical basis is a preliminary literature study by Gjølme and Staksrud Hansen (2014) with a supplemental literature study. The theory researched is within power, which is a controversial and comprehensive field of research - subject to tension between researchers all over the world. One of the main topics that are discussed is the basics of power theory - what is the definition of power, and how do you achieve a power submissive or dominant position towards another? In this thesis, we have viewed power as an outcome of two distinct relative power sources – Influence and Dependency. Two separate frameworks have been developed to visualise grades of influence and dependency, based on separate dimensions or principles. The findings from these frameworks are discussed to answer ten theory-based propositions used to conclude the research questions.

The main conclusions are that asymmetric power balance might occur in R&D-collaborations, but the asymmetry often varies based on the customer company’s experience. An important discovery is that the power asymmetry does not have a negative impact on the process as the more experienced part tries to compensate for the lack of experience with the other actor. This is considered as an advantageously power execution, if the power dominance is positive. A less sensational discovery is that these projects are similar to other projects, when it comes to planning, contracting and implementation.

The most influential implication is that the theory-based frameworks are functional to visualise grading of influence and dependency in an R&D-collaboration, and in the concluding chapter we present two sets of recommendations for optimising the collaboration, one set for the research institution and one set for the small company engaging the research institution.

Sammendrag

Formålet med denne oppgaven er å svare på hovedproblemstillingen: «Kan vi observere en eksistens av maktforskyvning i FoU-samarbeid, og hvordan er denne maktforskyvningen påvirket av avhengighet og innflytelse?» Hovedproblemstillingen er delt inn i tre underliggende forskningsspørsmål; (1) kan vi identifisere en asymmetrisk maktbalanse mellom forskningsinstitusjoner og små bedrifter? (2) Hvordan er maktfordelingen mellom forskningsinstitusjon og kundeselskapet når det gjelder innflytelse? (3) I hvilken grad er den lille bedriften avhengig av forskningsinstitusjon, og hvordan kan den lille bedriften få en grad av avhengighet som optimaliserer verdien av samarbeidet?

Tilnærmingen er et beskrivende casestudie av fire separate FoU-prosjekter som involverer SINTEF og en liten bedrift. Den empiriske dataen er samlet inn fra ti individuelle intervjuer med representanter fra SINTEF og representanter fra deres kunder. Det teoretiske grunnlaget er en innledende litteraturstudie av Gjølme og Staksrud Hansen (2014) med en supplerende litteraturstudie. Teorien som er utredet er innen makt, som er et kontroversielt og omfattende forskningsfelt - en spenningsskaper mellom forskere over hele verden. En av de viktigste temaene som er omtalt er det grunnleggende innenfor maktteori - hva er definisjonen av makt, og hvordan oppnår du en underdanig eller dominant posisjon mot en annen? I denne oppgaven har vi sett på makt som et resultat av to forskjellige relative maktkilder - Innflytelse og Avhengighet. To separate rammeverk har blitt utviklet for å visualisere graden av innflytelse og avhengighet, basert på dimensjoner eller prinsipper tilknyttet innflytelse/avhengighet. Funnene fra disse rammeverkene blir diskutert for å svare på ti teoribaserte proposisjoner som bidrar til å konkludere problemstillingene.

Hovedkonklusjonene er at asymmetrisk maktbalanse kan oppstå i FoU-samarbeid, men asymmetrien varierer ofte basert på kundeselskapets erfaring. Et viktig funn er at maktasymmetrien ikke vil ha en negativ innvirkning på prosessen, ettersom den mer erfarne parten forsøker å kompensere for manglende erfaring hos den andre aktøren. Dette anses som en fordelaktig maktutførelse, hvis maktdominans er positiv. En mindre oppsiktsvekkende funn er at disse prosjektene likner andre prosjekter når det gjelder planlegging, kontraktsutforming og gjennomføring.

Den mest innflytelsesrike implikasjonen er at de teoribaserte rammeverkene fungerer for visuell gradering av innflytelse og avhengighet i et FoU-samarbeid, og i den avsluttende kapittelet presenterer vi to sett med anbefalinger for å optimalisere samarbeidet, ett sett for forskningsinstitusjonen og en satt for det lille selskapet som engasjerer forskningsinstitusjonen.

Table of contents

Table of tables

Table of figures

1 INTRODUCTION

In this thesis, we are investigating the power distribution between small enterprises and large research institutions in new product development projects. The research consists of a literature study, followed by an empirical analysis. The aim of the research is to uncover any eventual power asymmetry in the relationships related to influence and dependency. We investigate how power asymmetry occurs, and if the partners involved are aware of any power asymmetry. Based on our findings we present recommendations for similar R&D-collaborations to come. The thesis presents suggestions for optimising project management in an R&D-collaboration where a small enterprise engages a research institute for product development. We have defined our research related to (1) societal and historical context, (2) theoretical context and (3) personal context, presented in the following chapters.

1.1 Societal and historical context

Constant increase in competition has made innovation more important in order to create blue oceans in different industries (Kim & Mauborgne, 2005). The increased competition is a consequence of products life cycles becoming shorter, globalization, unsecure market conjunctures (Anderson & Narus, 2003), and firms allocating more resources in R&D to pace up innovation and diversify technological capabilities (Luis and Sachwald, 2003). Innovation is also more available; The Norwegian Government states that "Innovation has always been a central source of value creation and for development of the welfare society" (Meld. St. nr 7 (2008-2009), 2008). In general, increased number and mobility of knowledge workers, combined with growing availability for venture capital makes it more possible to create innovation outside the large companies' R&D-departments (Chesbrough, 2003). This results in small enterprises being able to initiate R&D, thus needing guidelines for collaboration and project management with large research institutions. As The Norwegian Government states in "Melding til Stortinget 7 (2014-2015)":

"Knowledge and competence are among our most important competitive advantages [...] This also enables value creation[...] Research and education influences the economy by elevating the quality of the manpower and services delivered, making it possible to apply new solutions and products. This contributes to adaptability and enhanced productivity. A knowledge-based approach is essential to finding solutions that our society is facing. Examples of this are realignment to green growth and adapting to climate change […] Business and industry needs innovation and adaptability to secure employment and wealth creation in the future. "

Norway is in an early phase of realignment due to an unstable oil market (www.nrk.no, www.dn.no), and a focus on green and sustainable solutions (www.regjeringen.no). This means we must be prepared to use the research strength available in the most effective way, and aiding smaller businesses with

knowledge of this is a key factor in success. In total, entrepreneurship stands for 20-40 % of value creation in the western countries (Berglann et al., 2009). Outsourcing R&D is a growing trend among both small and large companies, creating new forms of network management (Andries and Thorwarth, 2014), and the growing trend for involving academia is encouraged by governments to create growth and wealth (Barnes, Pashby & Gibbons, 2002). If small companies are unable to involve academia, they will be depending on research institutions for outsourcing R&D. The new focus on managing relationships forces companies into a complex network with customers, suppliers and especially R&D-collaborators as counterparts. However, managing business relationships effectively appears to be challenging, given that an estimated 60% of partnerships fail (Spekman, Isabella, & McAvoy, 2000).

Results from our research will be able to aid entrepreneurs and small companies collaborating with large research institutions in R&D-projects. Our research will also prepare the research institutions for a potential change in customer needs related to their research services. As we investigate different R&D-collaborations from both the small company side and SINTEF's side, we get insight in the experiences on a personal level, which makes our research highly relevant for small companies and entrepreneurs.

1.2 Theoretical context

Extracting the benefits of a relationship is an important asset for a company with access to critical resources through an important partnership (Hakansson & Snehota, 1995; Dyer and Singh, 1998). Through proper relationship management actors can provide benefits by valuable performance or value creation in terms of knowledge and market. Their relations can grant access to other resources, organizations and competencies in order to contribute with indirect benefits (Hakansson & Snehota, 1995). Many researchers has acknowledged that the power distribution among participants in a business network may have great influence on the interaction in the network (e.g. Frazier, 1983; Olsen et. al., 2014). Research on organizational power and influence is however concentrated to the social interactions between actors within separate organizations (Lai, 2014). At the same time, collaboration theory consider the dependency aspect of a collaboration (Bergen et al. 1992), and risk of unwanted behaviour from the partner(s) (Shane, 1996). Previous research is mostly based on the individual level, or a competitive relationship, where most of the theory discuss how influence and persuasion techniques can give leverage on the partner (Lai, 2014, Emerson, 1962), in addition to the power balance in dynamic networks regarding the arising and development of power (Olsen et al. 2014).

Several authors (e.g. Andries & Thorwarth, 2014; Teirlinck & Spithoven, 2013) underlines one cannot discuss outsourcing of research and ignore firm size. However, it is common knowledge that small enterprises have limited resources, e.g. financial capital, human capital and experience. Outsourcing R&D activities might be an effective way of bringing external competence into the company (Van de Vrande et al. 2009). The research institutions' knowledge and expertise are resources that the

entrepreneurs cannot retrieve from other actors. This makes them critical resources for the success of the small business and causes a dependency (Hillman, Withers, and Collins, 2009), establishing the research institution as the partner with the bargaining power (Crook & Combs, 2007). This contributes to create a power imbalance or asymmetric power distribution (Jonesa et al., 2014). Albors-Garrigós et al. (2013) defines agents as facilitators for the their principals and also as natural in the role of leading projects, but states that the research organizations may have strategies related to their own performance, not necessarily optimizing the situation of the principal. Success of a research project may be perceived differently, universities for example, may see it as a success based on number of journal paper publications and number of patents filed (Barnes, Pashby & Gibbons, 2002). An irrelevant measure of success for the principal, whose focus we assume is on results of R&D leading to new products or services.

Our impression is that small enterprises with little experience cannot say how an optimal research project would be organized, and thus must rely heavily on the research institutions advice or choices for the project, causing a dependency not only for technical knowledge, but also project management. This potential automatic power delegation to the research institution might be experienced as natural, as the research institution appears as an experienced actor in the market. Thus, we are researching whether there is an unconsciously delegation of power from the small enterprise to the research institution and if the project should be formalized, or at least that all actors in an R&D-project should be aware of this unconsciously power distribution procedure. No theory, as we know, has been discussing consequences of this in depth, but by proving there is an automatic power distribution we may inspire more research in this field.

1.3 Personal context

We are involved in one small enterprise each, who are separately working together with the same research institution on different projects of product development, however on different stages. By clarifying this at an early stage, we acknowledge the potential critique related to our own subjectivity on the matter when interpreting the data (Dalen, 2004). Our reason for investigating this process is based on a disagreement where one of us is of the impression that the research institution deliberately uses a power imbalance to its advantage, and the other one disagrees, arguing that there is not necessarily a power imbalance, and if it was; the research institution is not abusing this deliberately. We consider our split-prejudiced opinion positive for the research, as it will contribute to level our pre-understanding influence on the analysis and conclusions. We aim to show theoretical sensitivity and insight combined with ability to give meaning to data, and understand them on an abstract level, and being able to part the significant from the insignificant (Dalen, 2004).

Our experience from R&D-collaboration with a research institution in our own separate development projects has taught us that a small enterprise often must relate to mainly one or very few representative(s) from the research institution. The representative acts as a consultant for the company speaking on behalf of the research institution. Initially, for each meeting with our assigned representative(s), we noticed the tendency to quickly accept the representatives' legitimacy when suggesting strategies and directions for further R&D. In retrospect, we determine this "acceptance" as a much too passive practice when determining the future of our company's R&D-based products. Especially compared to our behaviour in other settings such as negotiations with a customer or supplier. Our studies will show if this acceptance is common and related to SINTEF's level of influences. We explore the theory of influence on personal level by Cialdini (2001) in Chapter 2.2 - *Influence*, in order to narrow our research perspective within influence, and develop an interview guide accordingly.

We do not consider it negatively to trust the researcher / SINTEF representative in an R&D-project, and the psychological aspect of influence does not need to have negative consequences even though "we allow ourselves to be swayed more by experts who seem to be impartial than by those who have something to gain by convincing us" (p. 197, Cialdini, 2001). We do however not consider judgemental heuristics as an ideal way of decision making in R&D-processes. The decision should be informed and well reflected, not mental shortcuts such as "expensive is good" or "if an expert said so, it must be true."

Our focus on small enterprises collaborating with a research institution for product development through an R&D-process will be the baseline of the thesis. We investigate the potential existence of power imbalance in such relationships specifically to avoid getting overwhelmed by the data (Eisenhardt, 1989). As the subject is of our own personal interest, we collect data, which is representative for small companies in the same position as ourselves (Dalen, 2004). The personal interest lies in trying to optimize the R&D-collaboration processes we are involved in with the research institution. The results will be made available for other entrepreneurs in similar processes. Thus, we aim to not only contribute to research on the subject, but also contribute on improving applied research. The results will be knowledge suggestions, or probable knowledge suggestions described in condition images and models of understanding (Dalen, 2004).

1.4 Layout of this thesis

It is important that we document the entire process both to give the reader an insight in how data was gathered and utilized, in addition to letting the reader adapt "the glasses" or perception of us the researchers. Registering choices, changes etc. from the process will also make the work more transparent (Tjora, 2010). The structure of the thesis will follow the research progress in a chronological order to maintain a "red thread" and ensure that the reader has the same insight and understanding as us, the authors. We want to be as clear and transparent as possible, in addition to conceptually precise

and realistic (Kvale & Brinkmann, 2009). We present the knowledge obtained from the disciplinary literature on the research topic (Kvale & Brinkmann, 2009). Through the literature study, we aim to cover maximum variation of the phenomenon to be studied, and find the extremities, which can show different dimensions, and inspire to categorization of the data gathered (Dalen, 2004). The literature review, both regarding methodology and theory on the subject, will form the plan for data gathering and ensure our research can be validated. However, the case studies are quite specific and the field of research is new, existing literature is therefore not the main focus, rather than describing the reality for the case study subjects. We present the argumentation for performing a qualitative case study interview and how suitable cases are selected. The quality of the interviews is evaluated on the knowledge they produce and the aim of the research is to understand themes from the subjects' daily world from their own perspectives (Kvale & Brinkmann, 2009). The investigation of the data is focused around describing the separate phenomena to search for their common essences, allowing us to arrive at meanings on a concrete level, instead of general opinions. Further, on we present how the data collection was completed, and how our analysis led to a conclusion regarding how influence is divided in an R&D-collaboration within our scope. We also present recommendations for actors involved in a similar R&D-process, and further research possibilities along with critique and reflection regarding our thesis.

1.5 Purpose

As explained both of us are involved in start-ups collaborating with a large research institution for the first time, and thus expect "rookie mistakes" to happen, although the research institution is experienced. We investigate if these mistakes can be related to a possible power imbalance situation and if so; try to present practical guidelines, which may improve the collaboration process for other companies in the same situation. The research institution is also interested in learning how their customers experience the collaborations, and expect that there are some possibilities for improvement. We will present theory, expectations and research questions based on these assumptions before starting the actual interview process (Dalen, 2004). However, a top-level research question will always be the main theme of the thesis, and based on the presented context and title of our Master Thesis we present the problem statement as follows:

Can we observe the existence of power imbalance in R&D-collaboration, and how is this power imbalance formed by dependency and influence?

Our overarching problem statement in regards to power asymmetry in an R&D-collaboration between research institutions and small enterprises can be rephrased to three research questions;

RQ1:
Can we identify an asymmetric power balance between research institutions and small enterprises?

RQ2:
How is the power distribution between the research institution and customer company in relation to influence?

RQ3:
To which degree is the small enterprise dependent on the research institution, and how can the small enterprise obtain a level of dependency that optimizes the value of the collaboration?

In order to explain RQ1, we will look at the fundamental power theories. In this thesis, we are investigating the asymmetric power balance as (1) a result of uneven distribution of dependency towards each part, and (2) to which degree each part has influence over the other. In addition, we are considering research institutions as semi-commercial partner, meaning they might have hidden agendas. In order to explain power distribution, we are using the definitions from Emerson (1962) on dependency, and Cialdini (2001) on influence. RQ1 is a short version of the main research question and to answer this we need to combine the results from RQ2 and RQ3 as Influence and Dependency are the only factors we base the investigation of power balance on.

To answer RQ2, we review influence theory and identify which principles of influence affects the delegation of power, and we investigate which principles are relevant for our case studies. Working with a renowned organisation in a technical field might intimidate the customer, or let the customer develop a trust to the research institution's competence. Theory on influence suggest that such relaxed behaviour can come from "a tendency in the society to accept unthinkingly the statements and directions of individuals who appear to be authorities on the topic" (Cialdini, 2001). Cialdini writes about the interactions between individuals and we study the relationship between organizations. We experience that the personal relationship or interaction between individuals is the source of influencing directions of an R&D-project because often there is one or few representative involved from each party, resulting in acting on a more personal level than on an organisational level. This means letting the counterpart influence oneself by the trigger features for compliance which individuals of our culture have developed (Cialdini, 2001). The theory of influence is presented in Chapter 2.2 - *Influence*.

RQ3 addresses the topic of dependency, and to which degree dependency affects the collaboration in one way or another. In order to answer the research question, we are investigating the field of dependency, based on the definition of Emerson (1962, further elaborated in Chapter 2.3 - *Dependency*). Emerson's (1962) definition facilitates that power imbalance, through dependency, might be both positive and negative, and thus the theory creates a neutral ground for further research. In this RQ we presuppose that there is an asymmetric dependency distribution, and will investigate which impact this asymmetric distribution has on the project, and whether the small company should leverage the situation.

1.6 The contribution

Based on our literature research, we conclude that the subject is not sufficiently investigated, and as this subject might produce different knowledge based on demographics such as geography, nationality etc. it is important to investigate. It is important not only for science, but also for actors performing similar activities as the ones investigated, and with thoughts to Chapter 1.1 - *Societal and historical context,* thus contributing to the society. This underlines the necessity for doing a descriptive study of the current practice as we can focus on learning from the reality. Based on the fact that small enterprises are 99,5 % of active, Norwegian companies today (Bedreskatt.no), it is essential to secure a productive and successful R&D-relationship, not only for the specific company, but for the societal and economic wealth as a whole. This should also be an incentive for research institutions, as they may profit when customers grow and initiates more R&D. In addition, the goal of contributing to the society as a research institution could be achieved more often with more applied research. Although research regarding partner validation and evaluation exists (Schall, 2014), entrepreneurs are rarely in a position to choose which research institution to collaborate with, therefore reviewing potential of power balance is important. Possibility of establishing high technology and research based start-ups in Norway is highly related to economical and knowledge based resources, making this is an important field of study. Our research contributes to reducing level of failed research collaborations, resulting in more successful start-ups generating growth and employment possibilities in an insecure economy. Therefore we contribute to societal and historical context described in Chapter 1.1 – *Societal and historical context*.

1.7 Definitions

In Chapter 2 - Theory, we have performed a literature review with the aim of uncovering the power dynamics in R&D-collaborations between small enterprises and research institutions. In order to narrow the scope, we have looked at the dependency and influence aspects of power, whereas existing literature by Emerson (1962) and Cialdini (2010) combined with the literature study of Gjølme & Hansen (2014) will be the basis of the review. To set our initial boundaries and scope of research; the following definitions contextualize the actors and relationships involved. Definitions of *power, influence and dependency* are presented in Chapter 2 - *Theory*.

Research Institution(s)

Includes both commercial and non-commercial R&D-facilities. The institution must be independent, and do contract research on behalf of both private and public businesses. The institution will have the role of an agent or supplier of research and knowledge for the small enterprise. SINTEF can exemplify the definition as a research institution operating with contract research, ordered by their customers. SINTEF can enable disproving our perception of power asymmetry by making their customers/partners within the definition of contract research and small enterprises, available for empirical studies. The

Research Council of Norway has stated that SINTEF is the preferred R&D-institution to cooperate with for small enterprises receiving non-diluting grants, as small companies usually have few or no R&D-performing employees.

Small Enterprise(s)

Most literature regarding small enterprises include the medium sized businesses in one generic term; Small and Medium sized Enterprises, also known as SMEs. In this study, small enterprises are defined as a start-up company, small company or small enterprise in research based product development collaboration with SINTEF. The small enterprise will be working as principal of the project, and the product development is important for the company. The European Commission defines small enterprises as enterprises with turnover below or equal to 10 million EUR, and an annual work unit below 50 employees (European Commission, 2005). This definition is similar to the Norwegian definition, who sets the limit to 70 million NOK, and the number of employees not exceeding 50 (Law from 17th of july 1998 § 1-6 "Små foretak"). The similarity in definitions argue for both being used further in this study.

Contract Research

Outsourcing of R&D can be defined in different ways, but we generally view the term as purchasing a service (R&D) from a research institution when the service has not been completed in-house in the past, based on the definition of Gilley and Rasheed (2000). The relationship in focus will be contract research, where the start-up is the customer and research manager, and SINTEF is the agent / supplier of knowledge in a product development project. Inspired by The Research Ethical Committee of Norway's publication on contract research (2003), the definition of contract research here is (1) external financing, (2) customer decides the research question, (3) customer has user interest in focus, (4) customer owns the market relevant IP developed in the project.

Table 1 Definitions of Contract Research

Criteria	Description
External financing	Either the small enterprise pays the r&d with their own capital, soft, public or private funding.
Customer decides the research question	By customer we here mean the small enterprise engaging the research institution. By research question we mean the claim or requirements for the result of the r&d is set by the customer and not by a funding programme, or by the research organisation itself.
Customer has user interest in focus	As mentioned on page x, the research institutions may have documentation, reporting and publications in focus when researching, but the focus for investigated r&d-processes in this thesis must have the overarching goal of satisfying a potential customer of the small company or end user of a product.
Customer owns the relevant ip developed in the project	This is highly related to previous point (3) and our statement on page 9 that the small companies aim for new products with r&d. Control and ownership of the ip is of strategic importance to the small company related to both competition advantage and company value.

2 THEORY

This chapter introduces the theory relevant to our research. It gives a description of how we define the scope in order to focus on dependency and influence affecting asymmetric power distribution. We introduce and examine power-theory in Chapter 2.1 - *Power theory - A brief introduction*, before narrowing the scope, focusing on influence and dependency. As Graebner et al. (2012) emphasizes it is important that the claim of non-existing previous theory is correct, which was our focus during the preliminary literature review (Gjølme and Staksrud Hansen, 2014) and now. Each sub-chapter of 2.2 - *Influence* and 2.3 – *Dependency* finishes with stating proposals or research questions we work with during the empirical analysis, which are presented in a summary of propositions in Chapter 2.5 – *Summary of Propositions*.

2.1 Power theory - a brief introduction

There is substantial research on inter-organisational collaboration and in the field University Industry Linkage, especially on technology transfer and the commercialisation of R&D performed by universities (Plewa et al., 2013). This does not cover the contract research we study, as it is missing an in-depth research regarding R&D-collaborations defined as contract research where a small enterprise is the principal, and a research organisation appears as an agent. Ankrah et al. (2013) defines universities/academia as actors who are not interested in exploiting asymmetric relationships to gain control over resources managed by the partner. Their R&D-relationships often have collaboration in focus, in addition to stability and effectiveness, before necessity, legitimacy and transparency. IPR is more important than power as commercialisation rights in the end is a success factor. The research institution might try to get some kind of exclusivity or publishing rights to some of the results from the project. In addition, University-industry linkage theory describes the relationship development in stages, where the most relevant are (1) establishment of relationship, (2) engagement of the actual research, (3) advancement and evaluation of process (Plewa et al. 2013). Key factors for a good University Industry Linkage are defined as (1) communication, (2) understanding of needs and goals of partner, (3) trust in partner, (4) personnel facilitating collaboration and research. Schall (2014) defines Research institutions and universities as individual categories when describing scientific collaboration environments, supporting our separation of these two knowledge contributors. University Industry Linkage can be seen as contract research facility if defined as informal or formal technology transfer, where formal is cooperation supported by TTO's and informal if on a more individual level, such as technical assistance, consultancy or collaborative research (von Zimmermann et al., 2012). Few, if any, articles consider all the resources of a small company as a whole, possibly resulting in un-nuanced success criteria's. Other relevant theory regarding power and leverage mostly cover the subjects of

bargaining power, agent-principal theory, organizational power and/or trust. However, existing theory is not substantial when it comes to the principal-agent relation defined by contract research in this thesis.

Based on the literature research found in the book of Clegg, Kornberger & Pitsis (2011) there are six sources to power; control over resources, uncertainty, credibility / legitimacy, expertise, information and sanctions. In addition, other power sources in the network within a company's value chain might include; stature and prestige (Pettigrew, 1973, referred to in Clegg, Kornberger & Pitsis, 2011), access to top-level managers and control of money, rewards (Benfari et al., 1986). In this thesis, we are viewing power because of two power sources, *dependency* and *influence*, whereas we argue that several of the ten power sources mentioned above is influential sources to both dependency and influence. For example, it is common knowledge that information, expertise, uncertainty and prestige are influential sources determining the degree of dependency. In addition, access to top-level managers and control of money, sanctions, rewards and control over resources are highly influential when one should investigate the distribution of influence in a collaboration. However, in this thesis we are considering power from a dependency- and influence aspect, as most theories states (e.g. de Wit & Meyer, 2010) that these are the most considerable sources to power in an R&D-collaboration. Dependency and influence are, in this context, to be considered as overarching concepts that includes several of the power-sources mentioned above. A further elaboration of our definitions of these concepts are elaborated further in Chapters 2.2 – *Influence*, 2.3 – *Dependency* and 2.4 – Practical implementation of dependence theory

2.1.1 Power relations

Power, influence and dominance are frequently used terms describing one part's advantage or leverage towards a counterpart. These concepts have been widely explored both in theoretical and empirical studies (e.g. Weber, 1947, Baldwin, 1978, Lai, 2014, Emerson, 1962). Power is often misunderstood as a negative practice of responsibility. Power is often considered as a push and pull of attraction and repulsion, command and control. However, power is a lot more complex, involving 'the structuring of dispositions and capacities for action, as well as action itself (Clegg, Kornberger & Pitsis, 2011: 252). When most researchers are explaining power, they treat power as an attribute achieved by one person or small group. Our main research question investigates whether there is asymmetric power distribution in an R&D-relationship between small companies and research institutions. In such cases, the study proceeds to rank-order person by some criterion of power, creating what theory describes as *power-structure.* However, Emerson (1962) states that:

"...it is commonly observed that some person X dominates Y, while being subservient in relations with Z, and that these power relations are frequently intransitive. Hence, to say that "X has power" is vacant, unless we specify "over whom". In making these necessary qualifications, we force ourselves to face up to the obvious: power is a property of the social relation; it is not an attribute of the actor."

This is important to consider because we define power in a R&D-relationship as the 'domination ratio' in the relation between research institution and customer. When the relation is set, it is crucial to identify whether there is one party exercising domination, or power structured dominance, in order to achieve personal goals, or to "make A do something A not otherwise would have done" (Emerson, 1962). If so, it is important to find out "Why". If not, the relationship should possibly be considered a transaction-based relationship, or agent- principal relationship. In this thesis, whereas the research institution appears more like a subcontractor rather than a consortium partner.

In this thesis, we are investigating R&D-projects where each part is committed to the project through contracts, and formally defined as research partners. Contracts are often a good framework to facilitate collaboration, enhancing dynamic processes, but at the same time they may reduce the power of the principal (Mouzas & Blois, 2013). In addition, it might help decrease the risk of one party having hidden agendas, defining each participants clear objectives for the collaboration, combined with an evaluation of what risk that comes with the collaboration (Batonda & Perry, 2003). At the same time, it is important to limit transparency in a business, especially regarding knowledge sharing with partners Hamel, Doz and Prahalad (1989). However, the traditional procedure in such projects is that the R&D-facility are paid for their effort, and does not contribute with own effort. In such cases, the research facility should be treated as a subcontractor in our research. This is important to investigate, as the relationship clearly defines the dependency aspect from both parties. As presented in Chapters 1.2 – Theoretical context and 1.5 - Purpose our impression is that small companies may be unaware on how to optimize the R&D-process when working with large research institutions. Our experience in our own R&D-projects indicates that power asymmetry has direct correlation with (1) dependency of resources, and (2) influence ratios between the parties involved in the collaboration, further discussed in Chapter 2.2.1 – Principles of influence. This creates the basis for why we have chosen to investigate power from a dependency and influence aspect. To recap, in Chapters 1.1 – Societal and historical context, and 1.3 – Personal context, we define resources as financial and human capabilities, and thus a company's property in the A-B relationship. Considering this resource imbalance, it seems obvious that research institutions are better positioned to naturally obtain a stronger property of power, in a dependency point of view.

2.1.2 Relationship

One should carefully evaluate when to involve the research institution in the new product development, and how you should manage the relationship. By doing so, the project manager will increase the project efficiency, in regard to carry out an optimal amount of management capacity (time and money spent on communication, coordination, etc.) while making optimal use of supplier's expertise (Wynstra & Pierick, 2000). If the small enterprise is supposed to have influence on the process, clear regulations of power must be defined for the R&D-collaboration, which can be related to Batonda and Perry's (2003) clear objective establishment for the collaboration and the urgency aspect by de Wit and Meyer (2010).

As Dyer and Singh (1998) describes, relationships of strategic value are important in order to develop competitive advantage. The results of an R&D-collaboration are expected to be of incredible value for the small company regarding the competitive advantage. Working with specialized contributors is something that can describe the contract research relationship from the small enterprises point of view. We will investigate power from an influence and dependency aspect, and to which degree these assumptions are perceived as actual power advantages, and whereas power is seen as the actors possibility to influence the behaviour of other parties in a collaboration.

This could be relevant because some small companies might feel powerless if their research partner, the research institution, operates on its own terms and not according to the contract. This might cause conflicts in the relation, as is typical in relationships with competitors (de Wit & Meyer, 2010), but should not be a part of an agent-principal relationship. This is up for investigation in our thesis, as we describe SINTEF as a semi-commercial actor. All relationships will have a mixture of both positive and negative dependencies containing cooperative, competitive, and conflictual elements. From this discussion, we can see that network and relationship management is as much about ‘‘being manageable’’ as it is about managing (Wilkinson et al., 2002). They simultaneously involve both proactive and reactive elements. All relationships will have a mixture of both positive and negative dependencies containing cooperative, competitive, and conflictual elements. From this discussion, we can see that network and relationship management is as much about ‘‘being manageable’’ as it is about managing (Wilkinson et al., 2002). They simultaneously involve both proactive and reactive elements. Clegg, Kornberger & Pitsis (2011) also includes the ten power sources in the network within a company’s value chain. We argue that there is a strong relationship between inter-organisational power theory and network power balance in an R&D- cooperation. This is mostly due to two major factors, based on the R&D-cooperation requiring a lot of interaction and knowledge-sharing routines. This leads to (1) the research institution emerges as a natural part of the ecosystem in which the customer relies on, (2) it also emerges as a crucial part of the venture, and (3) standard R&D-cooperation requires a tight relationship, where the project management are managed by an independent steering committee, often represented by both parties. In other words, the relationship requires managerial performance from both parties, creating external factions that eventually are to be incorporated by the principal. As a result, these factions should be managed as an inter-organisational division within the company.

We also argue that R&D-relationships are characterized by a mix between unbalanced independence and unbalanced dependence (Defined in Table 6, Chapter 2.3 - *Dependency*), because the research institutions appears as independent, and small enterprises appears as dependent. In relationships where unbalanced independence/dependence appears, frequent interactions are required in order to optimize the outcome of the project/collaboration (de Wit & Meyer, 2010). Experienced project managers states that the frequency of initial and expected interactions in the relationship affects the collaboration. A collaboration with high number of interactions has greater potential for a successful relationship. In this thesis, the relation between small enterprises and research institutions are defined as a buyer-supplier

relationship, due to the transaction-based cooperation, where the small enterprises buys a service from the research institution (supplier). By including the supplier in product development, the contracting party may improve project effectiveness and efficiency (Wynstra & Pierick, 2000). However, management of the involved parties is important to ensure desired effects (Wynstra & Pierick, 2000). Our impression regarding R&D-collaboration with a research institution, is that this is difficult, due to the limited economic resources, as frequent interaction is costly.

2.2 Influence

In this chapter we present influence on a personal level as we argue collaborations we are researching to be personal in a professional context. Often the companies have one representative communicating with one or two representatives from the research organisation. Influence on individual level is therefore relevant for organisational behaviour. The theory of influence by Cialdini focuses mainly on the personal level, and we recognize this as relevant due to the situation of inexperienced customers in communication with the supplier is being perceived as quite personal due to one or few people involved from each actor. As mentioned in 1.3 – Theoretical context, the researcher acts as a consultant, and our experience is that we would easily forget to evaluate their arguments, and thus allow ourselves to be convinced by the expert's status as an "expert" (Cialdini, 2001). Regarding the aim of product development by R&D, does the expert represent a true expert? Are their research recommendations based on understanding the end user needs when developing a new product/solution for a customer? We will not research this, but we will research the level of influence SINTEF has and the potential automatic acceptance this results in.

2.2.1 Principles of influence

In this Chapter, we present the different principles of influence described by Cialdini (2001). We will describe their relevance to our research and give a reason for using the relevant principles in our case study. This is the foundation for identifying further aspects of the theory of influence on an individual level. The principles are - (1) reciprocation, (2) consistency, (3) social proof, (4) liking, (5) authority, and (6) scarcity, presented briefly in table 2, before elaborating on the most relevant principles:

Table 2 Principles of Influence (Cialdini, 2001)

Principle	Description (Cialdini, 2001)	Regarding SINTEF	Relevance
1 Reciprocation	- we should try to repay what another person has provided us - after accepting a gift customers are willing to purchase products and services they would have otherwise declined.	SINTEF rarely give gifts, but in the establishment of a relationship they give free meetings and aid in applications	Low - SINTEF involvement in the start, is a part of establishing the collaboration
2 Consistency	- once we make a choice or take a stand, we will encounter personal and interpersonal pressures to behave consistently with that commitment	SINTEF is headhunted, engaged, and paid by the small enterprises - it might feel contradictory to question the job they do	Medium - working with SINTEF is a necessity, and one is obligated by contract.
3 Social proof	- we determine what is correct by finding out what other people think is correct. - usually when a lot of people are doing something, it is the right thing to do	SINTEF could say "this is what others would do" or similar, but one would expect them to be innovative and independent	Low - the theory focuses on getting influenced by many others
4 Liking (Association)	- individuals associate someone with something positive and let this impression color their judgement - "It does not even have to be a logical one, just a positive one"	Groundbreaking science, research contributing to a better society, and success stories of SINTEF-startups, could result in the research institution being associated with something positive.	High - it is logical to want to be associated to an actor with a good reputation
5 Symbols of authority *)	- a shortcut for decision making is recognizing and being obedient to authority, as we have been trained to believe from birth - obedience to legitimate authority has taught us that this is effective in a work setting	- The R&D-process is no normal work setting, and automatic obedience should be avoided	High - academic experts, scientists, researchers has similar authority as physicians, judges, corporate executives, legislative leaders etc.
6 Scarcity **)	- the inexperienced entrepreneur might rush into a decision based on only the meaning of the scientist, forgetting to evaluate if there are other pieces of information available to help make a proper decision	- The scarcity of technical expertise or project management experience on the customer side, might increase the worth of the advice from the scientist or SINTEF representative.	High - The small businesses are dependent on external resources

**) We do not consider the symbols of authority a problem as Cialdini states in his work with social sciences (p. 196), but we do agree on the necessity to have a heightened awareness of authority power in an R&D-collaboration. Despite people with the mentioned titles "as a rule … offer excellent counsel".*

***) Scarcity causes dependency and is highly relevant and thus the subject is covered more by theory regarding dependency (Chapter 2.3 - Dependency)*

As table 2 shows, three principles are relevant for our research, and we will present two of them, *liking principle* and *symbols of authority*, in the following chapters. There we start building a framework for analysing empirical data based on the theory. The third principle, scarcity, we see highly related to dependency and therefore exclude it from the influence aspect.

2.2.2 Liking principle (Association)

The liking principle builds on the fact that we as individuals associate someone with something positive and let this impression colour our judgement. Several liking factors (1) physical attractiveness, (2) similarity, (3) praise, (4) familiarity, (5) association can make an impact on our liking. An explanation of each factor and relevance to our research in the table below:

Table 3 Factors of Liking Principle

Liking factor	Explanation (Cialdini, 2001)	Relevance
Physical attractiveness	Attractive people are more persuasive, the trait seem to make the person's talent, kindness, and intelligence seem better.	Low - SINTEF is not known for it's physical attributes, but for the knowledge and expertise they represent.
Similarity	We like people who are like us, and we are more willing to say yes to their requests	Low - SINTEF is a large research organisation and the scope of our study is small companies in collaboration with them
Praise	Compliments generally enhance liking, and thus, compliance.	Low - Although SINTEF might compliment on the product idea, but working with them should not be percieved as a compliment
Familiarity	Repeated contact under positive circumstances facilitates liking	Medium - If one has positive experiences (progression) in every meeting with SINTEF, one can start liking them, and opposite if the experiences are negative
Association	Being associated with something positive or important is favourable	High - getting your product/company and yourself associated with an important research institution can be very favourable and something one would hope to achieve.

We consider "association" the most important factor of liking, and will therefore research if the level of liking by association is influencing the customers of SINTEF. We will also uncover how representatives of SINTEF perceive themselves being liked, and the level of liking their collaboration partner. Familiarity is also an important factor because it may affect the liking. However, in this study, it is outside the scope to let the research regard association as only factor regarding influence by liking. In order to uncover answer to RQ2 "How is the power distribution between the research institution and customer company in relation to influence?" we ask:

RQ2a "What is the typical level of liking among the partners of an R&D-collaboration?"

The liking will be measured in three levels; (1) none/low, (2) medium and (3) high. The grading of likeness is based on how much SINTEF expresses themselves being liked in addition to how much the

small company expresses liking. The table below shows an example of how one can use the level of liking expressed by Customer or experienced by SINTEF representative:

Table 4 Example table for overview of expressed and experienced liking

	Case X*		**Case Y***	
Representative	Customer	SINTEF	Customer	SINTEF
Level of liking	Expressed high liking	Experienced high liking	Expressed low liking	Experienced low liking

*) Example cases not part of our research data

By placing the actors from the different cases in the table above, we can find extremities or signs of possibility to generalise an experience from the R&D-process. With aim of generalising the experience of liking in a R&D-collaboration we present the following propositions:

Proposition 1:
"Small businesses collaborating with SINTEF, will express high liking of SINTEF"

Proposition 2:
"SINTEF representative will perceive a high liking from their customer."

Proposition 3:
"SINTEF representative will express a high degree of liking their customer."

Regarding physical attraction; the traits talent, kindness and intelligence are also likeable and something positive to be associated with according to Cialdini (p. 175, Cialdini, 2001). These are however very person related, and we transfer them to the next chapter which will show a second nuancing of RQ2 on a more personal level.

2.2.3 Symbols of authority

As we have been trained to believe from birth, the potential of being provided with a valuable shortcut for decision making is recognizing and being obedient to authority (Cialdini, 2001). As mentioned in Table 2, the learnt obedience to legitimate authority has taught us that this is effective in a work setting. However the R&D-process is no normal work setting, and we want to investigate if we let this automatic obedience happen due to the symbol of authority in the title of an academic expert/scientist/researcher as we do with physicians, judges, corporate executives, legislative leaders etc. As mentioned in Table 2's comments, we do not consider symbols of authority a problem like Cialdini (p. 196, 2001) states in his work with social sciences, but we do agree on the necessity to have a heightened awareness of authority power in an R&D-collaboration. Despite people with the mentioned titles "as a rule […] offer excellent counsel". The socialization practices of instilling members of the society to the perception that obeying legitimate authorities is correct conduct, is one of the reasons the automatic acceptance exists.

Three types of symbols are shown to be effective; titles, clothing and automobiles. We rarely or never see the cars of the SINTEF representatives, thus we see automobiles irrelevant for our research. Clothing

can be recognized as more relevant, but considering communication not always being by personal meeting, we will investigate the influence of titles on the compliance. In order to do so, we need to explore the respect or thoughts of the SINTEF representative as an expert and treat these thoughts or respect as representative for authority by title. As mentioned in the previous chapter we research on a personal level, and therefore add the personal traits; talent, kindness and intelligence as attributes to the description of the role of the researcher or expert. We can expand the meaning to include knowledge/expertise as characteristics contributing to giving SINTEF the authority by power. To contribute in the investigation of RQ2 "How is the power distribution between the research institution and customer company in relation to influence?" on a personal level, we ask:

RQ2b
"Can we observe the authority role of the expert influence the small business?"

We grade the authority role influence in three levels: none/low, medium and high where the grades are set based on expressed entrust of power to researcher by customer representative, and the experienced entrust of power by SINTEF representative. The grading are to be sorted in a table shown below in Table 5:

Table 5 Example table for overview of expressed and experienced authority compliance

	Case X*		**CaseY***	
	Customer expressed	SINTEF perceived	Customer expressed	SINTEF perceived
Liking by association	High	Low / Undefined	Medium	Low / Undefined
Compliance by authority	High	High	Medium	High

**) Example cases not a part of our study*

This grading will not only show if the collaborating partners have the same experience from the process, but we can compare different customers' experiences as well as different SINTEF representatives' experience. This enables us to evaluate if one can generalize an experience for either party, or if the experiences are dispersed all over the spectre showing that generalizing the experience from an R&D-relationship based on compliance by authority is difficult. To focus our empirical analysis to answer RQ2b with an aim of generalising, we propose the following:

Proposition 4:
"Small customers of SINTEF respect their authority as experts, and often surrenders decision making to the researcher(s)"

Proposition 5:
"SINTEF representatives must often act outside their responsibility and administrate the process to ensure progress."

The role of SINTEF as an expert can also be related to the principle of scarcity because knowledge is an important part of the reason for choosing a research institution for R&D-collaboration. The scarcity

of technical expertise or project management experience on the customer side, might increase the worth of the advice from the scientist or SINTEF representative. Thus, the inexperienced entrepreneur might rush into a decision based on only the meaning of the scientist, forgetting to evaluate if there are other pieces of information available to help make a proper decision (Cialdini, 2001). Scarcity is as mentioned in Table 2 transferred to dependency, which is elaborated further in Chapter 2.3 - *Dependency*.

2.3 Dependency

De Wit and Meyer (2010) proposes that a company's possible power dominance over the counterpart are determined by how dependent one party is relative to another, and how tight the relationships is. It is widely recognized that when discussing power, one should consider the dependency aspect of the relationship. Hence, Emerson (1962) defines dependency as:

"The dependence of actor A upon actor B is (1) directly proportional to A's motivational investment in goals mediated by B, and (2) inversely proportional to the availability to of those goals to A outside of the A-B relation. Further, it is recognized that the greatest rewards within a coalition are given to the less dependent member of the coalition."

This definition will be the basis for what we consider as dependency in a R&D-collaboration between small enterprises and large companies in this thesis. This definition underpins the necessity of discussing dependency when considering power, and pinpoint three crucial factors that influences dependency, and further power; motivational investment, availability of external goals and scarcity as we transfer from the principles of Influence in Chapter 2.2.3 – *Symbols of authority*.

This is, with an assumption that the relationship is characterized as unbalanced dependence, whereas research institutions are independent, and small enterprises are dependent. De Wit and Meyer (2010) defines four categories regarding relative power positions in inter-organizational relationships; (1) mutual independence, (2) unbalanced independence, (3) mutual dependence, (4) unbalanced dependence. Table 6 presents the mentioned relative power positions, and gives a justification to selecting relevant theory for our scope.

Table 6 Relative Power Position

Relation	Description	Relevance
1 Mutual independence	Firms are independent in a relationship if they have relationship that only will interact on their own terms and they have the ability to break the relationship without any penalty. In other words, no other actor has significant power over the other.	Medium - the small enterprise is able to stop the project, and thus stop the subsidiarity. In that case, the project would stop, and no one would obtain value
2 Unbalanced independence	In a situation where two firms have a loose relationship, one side (Firm A) have more power than the other firm (B). In this case, Firm A is more dependent than Firm B. Firm A´s power gives it more freedom to act, while Firm B can be influenced by the powerful Firm A. This situation is called unbalanced independence, as both sides are independent, but one more so than the other	High - there may be an unbalanced power delegation, but the power imbalance is probably accepted and can be defined as a working power delegation
3 Mutual dependence	Describes relationships managed in a way that no firm is clearly more dominant than the counterpart (Ritter, Wilkinson and Johnston, 2004). De Wit and Meyer (2010) describes it as a tight relationship. Each firm depends on the other for important inputs.	Low - as the research institution don't rely on the subsidiarity from the small enterprise.
4 Unbalanced dependence	Characterized by asymmetrical dependence in a tight relationship where one actor has the power to dominate the other. In this situation of unbalanced dependence, the organization with the lower level of dependence will have more freedom to maneuver and impose its conditions than its counterpart	High - we presuppose that the small enterprise is dependent of the resources the research institution has

Relationships do not always fit neatly into these ideal types, but rather, they involve mixtures of interdependencies that can vary across issues and over time. In addition, the form of the interdependence can be both positive and negative. Positive dependence is when another firm's actions help a firm achieve its objectives, which is typical of relationships with customers, suppliers, and complementors (Ritter, Wilkinson and Johnston, 2004). In combination with our discussion regarding resources in *Chapter 1.1 Social and historical context* and *1.2 Theoretical context*, and partner structures in *Chapter 2.1.1 Power relations* this facilitates our sixth, seventh and eight proposition:

Proposition 6:
"Small companies perceive that they have a high degree of dependency towards SINTEF as they are partner structured."

Proposition 7:
"Small enterprises are highly dependent on the contribution from research institutions due to their level of expertise."

Proposition 8:
"An asymmetric dependence relation is unfavourable towards the small business."

De Wit & Meyer (2010) refers to previous research, stating that in order to determine the relationship between two companies one should consider both the dependency aspect and power balance between both actors. The outcome of this assessment will classify the collaboration as one of four possible

relationship categories, which we have used to clarify the dependency aspect in the collaboration in relation with power as shown in the table below:

Table 7 Different types of relationships

Types of relationship situations			
		B's perceived power over A (A's perceived dependency on B)	
		Low	High
A's perceived power over B (B's perceived dependency on A)	Low	No relationship	Followship relationship
	High	Leadership relationship	Mutual relationship

Our evaluation indicates that the collaboration is characterized as a (b) Leadership relationship. Our evaluation is based on the theoretical principles described in Chapter 1.2 – *Theoretical Context*, stating that small companies has limited resources, both financial and competencies, whereas SINTEF has both a stable finance and experience and competencies. Hence, SINTEF has low perceived dependency towards small companies, while the small company rely on SINTEF in order to perform R&D.

These findings, together with the theory described in advance of Table 6, indicates that the dependency-relationship between a small enterprise and a large research organisation is characterized as an unbalanced dependence. This assumption is a result of our beliefs that small enterprises has a strong conception of dependency to the research institution, and the research institution is independent from the small enterprise. At the same time, there is a dependency aspect to consider, whereas research institutions possess leading and unique expertise, which eventually gives the small enterprise few or no options with regard to collaborate with other partners. It is this dependency that can have a negative or positive impact on the under leveraged part as, for example, a positive dependency is when the empowered enterprises actions help the underleveraged part reach its goals - typical in customer-supplier relationships (Ritter, Wilkinson and Johnston, 2004).

This is directly linked to our understanding of power in this thesis; influence on the behaviour of other parties in a collaboration. This also includes influence over the final product, and influence on the ongoing process in the project. A company's possible power dominance over the counterpart are determined by how dependent one party is relative to another, and how tight the relationships is (de Wit and Meyer, 2010). Research institutions may therefore have a lot of power towards small enterprises because small enterprises often are dependent on the particular competence that research institutions possess, and that projects contracted by small companies are relatively small.

Concerning traditional organizational theory, being dependent, and thus creating an asymmetric power distribution is not necessarily associated with poor project management, power exploitation or domination. In the contrary, most theories underpin the necessity of delegating responsibility to optimize project effectiveness (de Wit & Meyer, 2010; Lai, 2014). For example, positive power might

be when another firm's actions help to achieve its objectives, which is typical of relationships with customers, suppliers, and partners (Ritter, Wilkinson and Johnston, 2004), in this context, research institutions use their experience and expertise to help small companies in an unbalanced dependence relation. A typical example of positive power related to our RQ would be if SINTEF used their experience in managing R&D- collaborations to guide the small, unexperienced company, and provide them with valuable input. Based on these findings, we propose our eight proposition:

Proposition 9: "There is a direct link between success in the project and whether there are exercised positive or negative power by either A or B towards another."

2.3.1 Inter-organisational R&D collaboration

Many resource limited firms choose to collaborate with each other on R&D as their technical skills complement each other, and may result in innovative and high quality technology contributing to the firm's portfolio and market share. One of many alternatives within strategic alliances to satisfy a company's need for resources (Hoffmann and Schlosser, 2001).

Whether a company desires higher order knowledge, ensuring others know what you know (Fontana et al.,2006) for power display or collaboration recruitment could be an interesting study in addition to the discussion regarding power within the collaboration. Due to the missing crucial element, research institutions, this field is defined to be outside of the scope of our Master Thesis. The matter is important not only for small enterprises collaborating with small enterprises, as collaboration can occur between large companies and small enterprises as well. We argue that there is a strong relationship between inter-organisational power theory and network power balance in an R&D-cooperation. This is mostly due to two major factors, based on the R&D-cooperation requiring a lot of interaction and knowledge-sharing routines, leading to (1) the research institution emerges not only as a natural part of the ecosystem in which the small business rely on, but as a crucial part of the venture, and (2) standard R&D-cooperation requires a tight relationship, where the project management are managed by an independent steering committee, often represented by both parties. In other words, the relationship requires managerial performance from both parties, creating external factions that eventually are to be incorporated by the principal. As a result, these factions should be managed as an inter-organisational division within the company. Thus, we have created our tenth proposition:

Proposition 10:
"R&D projects are dependent on managerial competence in order to perform a successful collaboration, with no preference whom possess this competence."

2.4 Practical implementation of dependency theory

In Chapters 1.2 – *Theoretical context* and 2.1 *Power theory – a brief introduction* we discuss several theories regarding power. We have viewed power relations from an influence and dependency aspect,

and will in this chapter present how we use our findings in the literature review in order to develop a framework describing the optimal collaboration between small enterprises and research institutions. In total, we identified 5 dimensions that are to be seen as direct influencers on the dependency-relationship between two or more parties, (1) project experience, (2) technical expertise, (3) alternative outsourcing, (4) urgency, and (5) financial resources, defining the strings which ties the companies together, creating a to-ways perception of dependency from both sides of the collaborative relationship.

Table 8 Dimensions of dependency

Dimension	Description
Project experience	To which extent does the company holds relevant experience with managing R&D development processes?
Technical expertise	To what extent does the company hold technological competencies to develop the product in-house?
Alternative outsourcing	How many alternatives has the company with regards to choosing a different R&D-partner?
Urgency	How urgent is the need, and will the collaboration with SINTEF help them solve a problem in an earlier stage?
Financial resources	What impact has the collaboration on the company's financial statements?

First, it is essential to understand that these relationships are oriented as an agent-principal collaboration, and that there always will exist some dependency from both parties. In this thesis, agents appears as small enterprises with a distinct need for an expanded knowledge- and resource base, whereas the principal, SINTEF, are dependent on customers to survive. This chapter is subject to an important field within collaborative theory, as collaborations has the potential to drastically scale up your company, and at the same time ruin your business concept. This theory is not developed as a tool to see if there is a dependency present in the projects, but how it appears, and to which extent.

As mentioned in Chapter 1.1 – Societal and historical context, most partnerships fail mostly due to poor planning. That is why we have looked into the question of dependency, whereas our initial assumptions were that small enterprises feel too committed and dependent towards their R&D-performing partners, and thus fails to explore their opportunities and potential development. In addition, we believe that the financial grants from the Norwegian government seems overwhelming on small companies, and creates subconscious ties towards partners.

2.5 Summary of propositions

We are investigating a total of 10 propositions based on our literature theoretical review. They are presented together here:

Table 9 Overview of Propositions of the Thesis in relation to research questions

#	Proposition	RQ
1	Small businesses collaborating with SINTEF will express high liking of SINTEF	RQ2
2	SINTEF will perceive a high liking from their customer.	RQ2
3	SINTEF will express a high degree of liking their customer.	RQ2
4	Small customers of SINTEF respect their authority as an expert, and often surrenders decision making to the researcher(s).	RQ1, RQ2
5	SINTEF representatives must often act outside their responsibility and administrate the process to ensure progress.	RQ1, RQ2
6	Small companies perceive that they have a high degree of dependency towards SINTEF as they are partner structured	RQ1, RQ3
7	Small enterprises are highly dependent on the contribution from research institutions due to their level of expertise	RQ3
8	An asymmetric dependence relation is unfavourable towards the small business.	RQ3
9	There is a direct link between success in the project and whether there are exercised positive or negative power by either A or B towards another	RQ1, RQ3
10	R&D projects are dependent on managerial competence in order to perform a successful collaboration, with no preference of whom possess this competence.	RQ3

As pointed out in Chapter 1.5 – *Purpose*, RQ1 is dependent on RQ2 and RQ3 to fully give an answer to our main research question. In Table 9, we have visualized which propositions (4, 5, 6 & 9) will mainly contribute to the discussion regarding the existence of asymmetric power balance in an R&D-collaboration.

3 METHODOLOGY

In this Chapter, we are describing the research design in this thesis. We would like to point out that it has been adjusted to increase readability, but the Chapters 3.1 - 3.10 describes the process in full. Qualitative research and the use of case study method will be explained. The chapter will cover how we planned and conducted data gathering through interviews, in addition to describing the execution of data analysis. Our study will follow the seven stages of study; (1) thematising, (2) designing, (3) interviewing, (4) transcribing, (5) analysing, (6) verifying, (7) reporting (Kvale & Brinkmann, 2009).

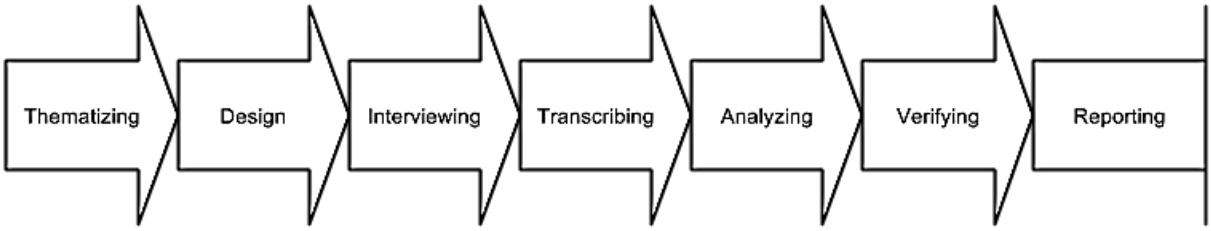


Figure 1 Seven stages of study

The aim is to develop insight related to a phenomenon, and enabling the insight to be tested with the development of concept or theory (Tjora, 2010). We consider qualitative interview suitable for the research as we need insight in our informants own experiences, thoughts and feelings (Dalen, 2004), so that our research can improve processes for others involved in similar relationships. Through our mentioned Project Thesis (Gjølme & Hansen, 2014) we performed a literature study and revealed the theory on power imbalance in R&D-collaborations was insufficient. This led us to thematise our research and set theoretical sail for power asymmetry by dependency and influence. The methodology of the literature research is described in the Project Thesis, and we thus only present the methodology related to further research related to the Master Thesis.

3.1 Qualitative research

In dialogue with the research institution SINTEF, and in our theory research we have discovered that the collaboration between a small enterprise and a research institution, aimed at product development, is not heavily studied. We aim to have a descriptive study to discover new dimensions in the research topic (Kvale & Brinkmann, 2009) and the questioning may continually improve as we learn more about a topic. As there is little theory available and we aim to understand and improve the R&D-collaboration process in aspect of dependency and influence; understanding through a qualitative study is much more suited than quantitative research. As Kvale and Brinkmann (2009) states qualitative research has become endemic and is here to stay. The lacking theory also makes this a descriptive research. The question is whether to focus on theory-building research (Eisenhardt, 1989) and explore this through

an empirical study in an inductive way (Tjora, 2010) “unbiased by preordained theoretical perspectives or propositions” (Eisenhardt, 1989), or a deductive way comparing theory to empiric data (Tjora, 2010). Either way the gathering of data will be qualitative, based on little prior research/theory, little available empiric data within the scope of the study and our desire to perform in depth interviews to get insight in the interview subjects experience.

Regarding that we had prior knowledge of power from our project thesis we focus on a deductive process. We are inexperienced in the qualitative research knowledge, so a thorough literature review introduced us to themes within the research topic, which inspired our research questions, and will help us specify some potentially important variables for sorting the empirical data (Eisenhardt, 1989). Our method for data gathering will be interviews and the interviewer is also expected to master theoretical knowledge of interviewing and of the interview topic (Kvale & Brinkmann, 2009).

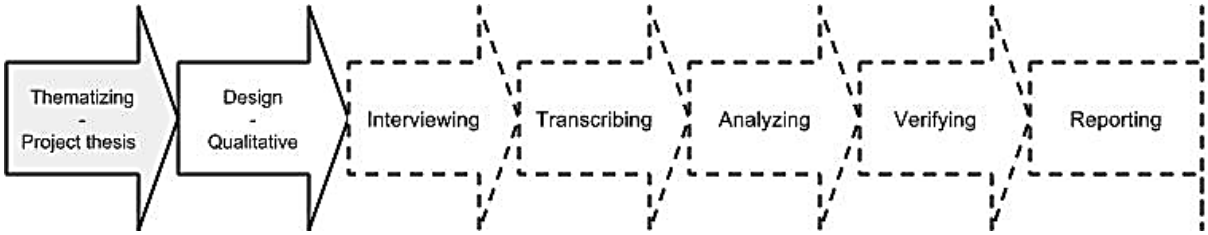


Figure 2 Seven stages of study - Thematising 1

3.2 Case study

We aim to learn from the processes other small enterprises have had with the research institution, and will perform multiple interviews increasing the possibility of being able to generalize findings. We investigate both the research institutions’ and small enterprises’ side of the stories to ensure the complete understanding of the process (Tjora, 2010) and uncovering of elements that influence the R&D-process. Case studies can involve either single or multiple cases (Eisenhardt, 1989) and we focus on multiple as this enables the us to look for within-group similarities coupled with intergroup differences in cross-case analysis (Eisenhardt, 1989) and discover if there is anything typical about the process (Tjora, 2010) .

Authors have stated that case study is not defined by specific guidelines (Eisenhardt, 1989), but there are guidelines and standard choices of approaches and techniques at the different stages of an interview investigation (Kvale & Brinkmann, 2009). We will use this knowledge to adapt the case study method to fit our research in the best way possible. We will focus on the performance and behaviour of the research institution and small enterprise (Tjora, 2010), and conduct interviews in this case study with representatives from both sides of the collaboration. We aim to build knowledge about the normal behaviour for a research institution and a small enterprise in an R&D-collaboration (Tjora, 2010) and

investigate the experiences to uncover potential improvement of process. The relationship situation in the collaboration is in focus for the investigation (Tjora, 2010).

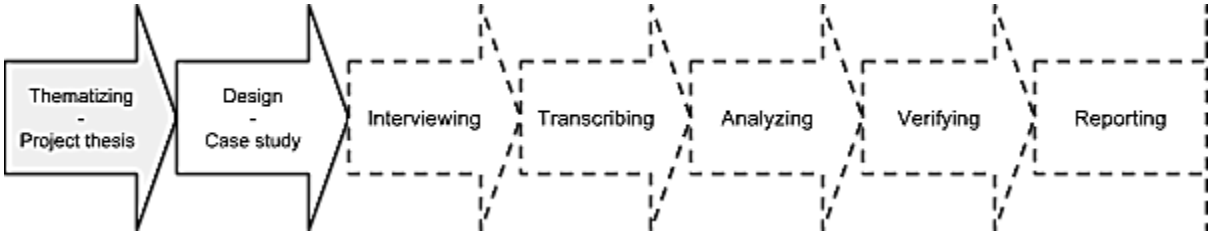


Figure 3 Seven stages of study - Thematising 2

3.3 Interview

Investigating personal experience and opinions from subjects is something we are used to from NTNUs School of Entrepreneurship, where market research and direct feedback from potential customers, business partners or market/business experts is highly valuated. Combined with the opportunity to get direct insight in processes similar to the ones we ourselves are experiencing with our businesses, interview is the best approach. It will enable us to unveil unexpected information as well as limit the research when the informant has the opportunity to share interesting experience and thoughts on the research subject (Tjora, 2010). The interview lets us attempt to understand the world from the informants point of view and uncover their lived world prior to scientific explanations (Kvale & Brinkmann, 2009). The interviews are semi structured with an interview guide to ensure the preferred topics are discussed with the interviewee / informant (Dalen, 2004). The interview guide can be found in Appendix A - *Interview Guide*, and detailed description of the structure in the interview guide is found in Chapter 3.4 – *Interview guide*. By obtaining descriptions of the world of the interviewee we may interpret the meaning of the described phenomena (Kvale & Brinkmann, 2009). Both the meaning behind the answer itself, but also if the phenomena has any meaning for or influence on the R&D-process or actors involved. Also, research interviews have the purpose of producing knowledge (Kvale & Brinkmann, 2009).

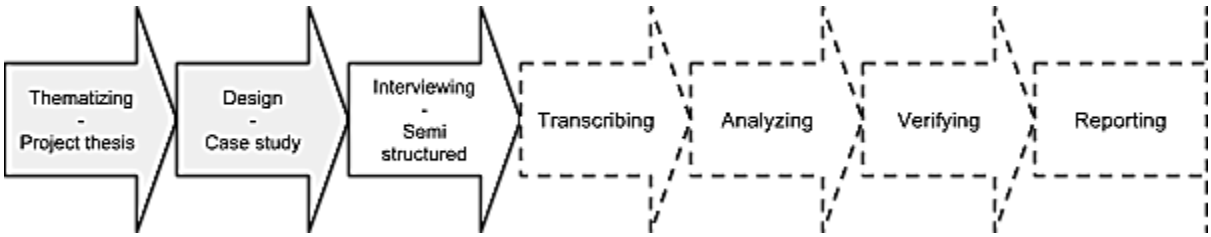


Figure 4 Seven stages of study - Design

3.4 Interview guide

Based on the investigated theory in the project thesis we base our interview on themes related to the R&D-collaboration and develop interview questions organized under these. We rely on past literature and empirical observation or experience as well as on the insight of the theory to build incrementally more powerful theories (Eisenhardt, 1989). We follow the interview structure suggested by Tjora:

- Warm up questions (short, simple and concrete)
- Reflection questions or "grand tour questions" describing the important aspects of the case
- Rounding off questions (leading the attention away from the reflection)

We focus on making the interview subject feel comfortable from inviting them to participate. We introduce the importance of the research for others to learn from their experience and our plan to keep their participation anonymous. We also introduce the subject of the interview, to be focused on discovering positive or negative patterns in an R&D-collaboration, which can be used to develop guidelines for others in similar collaborations. Mentioning that we are in the same situation may calm the interviewee as we can relate through common experiences (Dalen, 2004). Regarding the place of the interview we insist on visiting the interview subject. This ensures that we occupy as little of their time as possible, combined with letting them have the comfort of being in a familiar place, e.g. their own office or a meeting room belonging to the organisation they represent (Tjora, 2010). The length of the interview is aimed to be 60 minutes, but can end in 90 minutes if the interview subject is talkative. This is to ensure the interviewee becomes comfortable with the situation and is willing to share his/her thoughts, but at the same time it is not so long that they become tired (Tjora, 2010). We continue the focus of comfort and make sure to develop the questions order in the least stressful way possible, for example by using the first minutes to let the interviewee hear about the process of transcribing, analysing, verifying and reporting, and inform them of the anonymization of the information. Questions in the interview guide are predefined, an option introduced by Tjora (2010). This approach ensures that everyone gets the same interview questions and makes it difficult for the interviewer to leave anything out or give questions a new meaning by improvising only aided by key words or cues. Predefined questions also provides more impression of seriousness. We divide our questions into 5 categories: (1)General information, (2) Project/R&D-collaboration (3) Small enterprises power, (4) Power asymmetry, (5) Industry Academia collaboration. In Table 9 we present the mentioned categories and the empirical focus of each category:

Table 10 Categories and example questions from interview guide

Cathegory	Goal / Focus	Example question(s)
1 General information	Familiar information for the interviewee which is easy to talk about. Information valuable to describe the person and his/her role in the project	Name?, Organisation?, Relevant background/previous experience?
2 Project / R&D Collaboration	Get insight in the general development of the collaboration and if the interviewee remembered any particular incidents by asking open questions on the subject. Start the process of remembering and reflection for the interviewee. We also let the interviewee define what success is for a project and if the discussed project was a success.	Duration of project? What insights did you gain during the process? What defines a success for an R&D-project?*
3 Power of the small enterprise	Discover any power imbalance and clarify which power position the small enterprise had in the collaboration. We don't introduce the term power yet as it can be negatively loaded, but we use the questions to let the interviewee start reflecting on one of the partners possibly having more saying than the other.	What influence did you have on the research institution? What experiences regarding level of influence should one be aware of?
4. Power asymmetry	Heavily focused on how partners in the collaboration can influence each other. We start discussing power in a neutral way, but quickly develop into trying to identify more signs of power imbalance in the R&D-collaboration. We introduce them to our definition of power (the ability to influence a partner) to ensure interviewees have the same starting point discussing this subject.	How will you describe the level of power for the parties involved in the R&D-project?
5. Industry Academia Collaboration	Talk about the relationship between the small enterprise and the research institution to let the interviewee reflect on both upsides and downsides of the process, in addition to define their learning. Letting them deliver a recommendation gives the experience of contributing with knowledge and a sense of achievement at the end of the interview.	How was the communication? Are there any recommendations you would give to a small enterprise who is about to collaborate with SINTEF in product development?

**) For this question we follow up with "five why's" to create more reflection. We also let them define what success is for an R&D-project after defining whether their project is a success or not. This ensures their personal opinion on how successful the collaboration was, and makes them reflect on what really matters afterwards.*

!) The interview guide can be read in full in Appendix A - Interview guide Note that the questions are originally formed to be asked a small enterprise representative, but all questions are easily adaptable into an interview setting with a SINTEF representative.

Some of the questions might seem similar, and the purpose of that is ensuring the interviewee gets the opportunity to reflect on the subjects several times. The subjects and questions are based on our three research questions, presented in Chapter 1.5 - *Purpose*:

Table 11 Research Questions

RQ 1	**Can we identify an asymmetric power balance between research institutions and small enterprises?**
RQ 2	**How is the power distribution between the research institution and customer company in relation to influence?**
RQ 3	**To which degree is the small enterprise dependent on the research institution, and how can the small enterprise obtain a level of dependency that optimizes the value of the collaboration?**

3.5 Interview execution

All interviews are performed by Lars Gjølme as interview lead as he has most experience from similar activities, both from interview courses related to a live role play camp ("På flukt") organized by The Norwegian Red Cross to teach youth about stress experience for refugees. In addition, Gjølme has completed an elite trainer course with Olympiatoppen where the main focus was "coach/athlete relationship" and focus interviews regarding performance and mental training. The use of one permanent interviewer ensures that the interview situations and completion were as similar as possible for all interviews. Different performance and personality could weaken the quality of the project due to interview subject not participating in similar interviews (Dalen, 2004). Fredric Staksrud Hansen would observe interviews, take notes, and control check that Lars followed the interview guide.

The interviews were recorded on a mobile device Samsung Smartphone or Tablet. The recorded files were transferred to computers for transcription using Bluetooth or memory cards. The recording devices were introduced early and naturally. Justified by the aim of accurate citation, and ensured by correct processing according to The Norwegian Data Protection Authority (Datatilsynet), and ensuring anonymization of the interview subject. In addition, it freed the interviewer to focus on the interview (Kvale & Brinkmann, 2009). No interview subjects had problems with the recording device, and they have forgotten about it as soon as the interview started. All interviews were planned via e-mail or telephone letting the interviewee be in charge and avoiding power imbalance in the interview situation (Kvale & Brinkmann, 2009). Although an interview guide would form us as leader of the interview, we want them to experience as much control as possible. All interviews would proceed as planned, covering all the questions from the interview guide, with some digressions resulting in uncovered themes important to the interviewee. These could be important to the research and were investigated on the spot to ensure potential relevance was not lost. We also questioned thoughts expressed by the interviewee to follow up and investigate in depth if something seems unclear or was interesting. However, we did not ask counter-questions to test the strength of the belief (Kvale & Brinkmann, 2009), based on our level of experience in both the subject and research method, and the impression of the interviewees being

well reflected and answering to their full capacity. A total of ten interviews were completed, together representing four cases

Table 12 Interview details I

Interview #	Duration	Interview Lead	Transcribed by	Case
1	0:46:15 (telephone)	Lars	None*	None*
2	1:26:00	Lars	Fredric	A
3	1:00:59	Lars	Lars	A
4	0:40:04 (telephone)	Lars	Fredric	B
5	0:53:48	Lars	Lars	B
6	1:01:03	Lars	Fredric	C
7	0:46:05	Lars	Lars	C
8	1:33:07	Lars	Fredric	D
9	0:48:08	Lars	Fredric	D1
10	0:51:28	Lars	Fredric	D2

**) Interview 1 was a test interview in order to verify that interview questions would give types of answers we could use. We listened to the recording and discussed both performance of interviewer and found answers interesting enough to continue using the interview guide unrevised.*

In one of the interviews, the respondent (employee at SINTEF) considered himself a bit too outspoken as he described/categorized the CEO of SINTEF in a humoristic way. He was the only one pointing out that something should not be used from the interview, but then only referring to the mentioned joke about the CEO. One of the respondents (employee at SINTEF) expressed he felt he repeated himself and never gave good answers. We assured him that it was the structure of the interview forcing him to do this, and that he indeed was answering the questions in a way relevant for our research. No other events from the interviews occurred which was a response to the interview situation. One interview (customer of SINTEF) was performed by telephone. This resulted in a significantly shorter interview, which may be due to the fact that the interviewee was in a hurry, and asking follow-up questions did not happen as often and natural as in the interviews person to person.

3.6 Transcribing

After each interview, Lars transcribes the interview himself or Fredric transcribed it. This might result in different transcription techniques, but strict rules ensure as similar transcription as possible:

- All spoken words are to be written, even when just partially spoken and replaced by the interviewee with a “thinking sound” or synonym
- All spoken words should be transcribed into norsk bokmål
- Unclear / unintelligible spoken words are to be discussed with research partner to ensure all listening attempts are tried
- Thinking sounds should not be included, unless important to illustrate a thought process or rephrasing during a spoken sentence

The rules abstract (Kvale & Brinkmann, 2009) the interview quite a lot when ignoring thought-sounds and changing dialect of the speaker, but ensuring a uniform data collection for interpretation and analysis was considered more important. Transcribing all spoken words ensures the possibility of interpreting correctly and makes the text easier to relate to and making the data more comparable. Making the data comparable will make analysis easier, and all interview subjects has performed a quote check on the use of their expressions/answers enabling them to point out if we have interpreted them the wrong way. After the transcription we have a certain amount of treated data ready for analysis. Selecting the relevant sections and parts for our analysis would be the next step (Tjora, 2010).

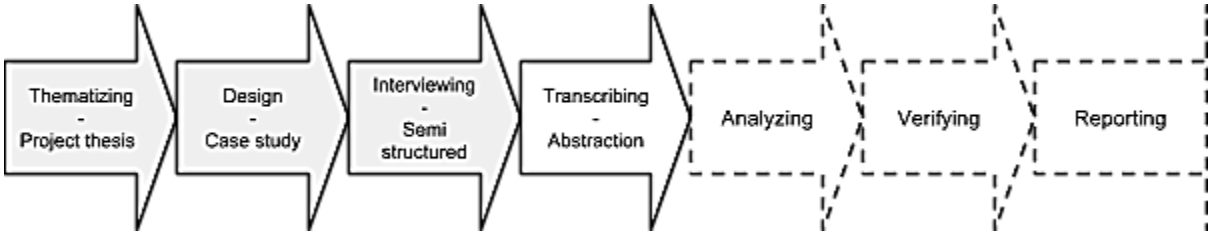


Figure 5 Seven stages of study - Interviewing

3.7 Coding

Our initial approach to coding is reading the transcribed interviews, extracting the data that clearly relate to the research subject in a method of "meaning condensation" (Kvale & Brinkmann, 2009). By "clearly", we mean expressions or parts of answers from the interviewee addressing the process, the collaboration, the communication, the partner or the product in the R&D-collaboration. Expressions that we perceive as relevant without any specific category, but cannot be left out, are also extracted. We do this initial extraction of meaning units individually to ensure all relevant data was included into the next phase. This first step in the meaning condensation is not only a way to determine the natural parts of the text to analysis, but also a way to give a sense of the whole (Kvale & Brinkmann, 2009). Further, we work with our predefined codes to find the theme(s) of the meaning units. We read each meaning unit marking it with the relevant code(s). If no predefined code covers the aspect, a new one is developed. With this process, we can summarize and quantify how many answers were related to different themes, and it makes it possible to retrieve and read meaning units within the same category. We start with 18 predefined codes, and add 21 more while coding meaning units. The codes are found in Appendix B - *Codes*. When a meaning unit has been coded, we concentrate and abstract the meaning unit to ensure it can be understood in a more general perspective, still from the interviewee's perspective, but more comparable to other interviewee's concentrated abstractions.

The model presents how an original response is developed into a concentrated abstraction:

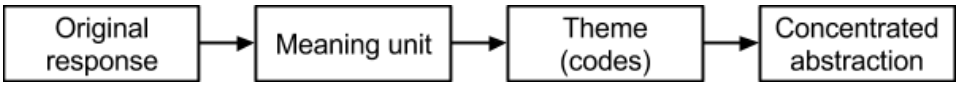


Figure 6 Model of process from original response to concentrated abstraction

The following table gives an example of a response from SINTEF representative in case B being abstracted. The question was "Can you describe the influence the small enterprise has on SINTEF?" and was asked to a SINTEF employee:

Table 13 Example of progress from original response to concentrated abstraction

Original response	Meaning unit	Theme (code)*	Concentrated abstraction
Very good I would say, in a sence that they are imoportant for the criterias. So innitial-, and they contribute with technical input gradually. This means they were more important in an early stage, than later. They also had the attitude, ie there is not much funding, ie project funding for the customer, so they were pretty clear on the matter early; that "now you must work, and we'll stay in the background." So they don't do that m-, they don't have any other active stake than giving input… Participate in a few technical telephone meetings and yes, other communication [...] Mostly requirements, and little or less on technical details, and very little regarding redistribution of project funds.Well, they were affirmed by the application, and then these funds are locked. So even if the Customer could want the project put together in other elements and maybe prioritized other things, the partners and the project funding given by the application. And no one is willing to change that.	they are imoportant for the criterias. So innitial-, and they contribute with technical input gradually. This means they were more important in an early stage, than later. They were pretty clear on the matter early; that "now you must work, and we'll stay in the background." Even if the Customer could want the project put together in other elements and maybe prioritized other things, the partners and the project funding given by the application	1F. Communication, Planning 3F. Planning, Contracts 1L. claims 2L. expectations 3L. Screening	Researcher at SINTEF feels that the customers influence in the project varies with the different stages of the development process, but that the customer is important as an overarching facilitator. At the same time SINTEF feels they have an obligation to fulfill initial claims and goals in the funding application.This can be related to planning, contracts and communication. The customer had influence early in the proejct by stating claims for the product. They also expected SINTEF to work independently.

**) We worked separately in the process of coding to ensure as many perspectives as possible were considered in the analysis.*

After we finalized this process with all of the interviews, we sent the full table back to each respondent, in order to let them comment on whether we had understood their meaning properly. They had a full work week to respond and comment, and one of the respondents (SINTEF A) had some comments to our understanding of what he was communicating. We updated the SINTEF A table, and interpreted his feedback in our analysis.

3.8 Findings

Analysis of the data is done with regards to two subjects; "Dependency" and "Influence." This chapter will describe the progress of analysis for each subject separately to give an impression of how we focused our research.

3.8.1 Influence

Influence was widely covered in the interview guide to ensure we could discover some consistent results. As we are focused on understanding the subject's point of view (Kvale & Brinkmann, 2009) we separated the analysis with regard to the role of the interviewee. Answers from all SINTEF employees are gathered in one group, and all respondents representing customers are gathered in another. This enables us to find whether answers are unified or widespread within a group, and also if perceptions are shared from both sides. At the end of the analysis we will present case by case the perception of the process among the respondents. The table for findings is revised slightly from Table 4 in Chapter 2.2.2 – *Liking principle (Association)* and Table 5 in Chapter 2.2.3 - *Symbols of authority*.

Table 14 Combined Influence Table

	Customer				**SINTEF**			
Case	X expressed		Y expressed		X experienced		Y experienced	
Level of Influence	High liking by association	Medium authority respect	High liking by association	Medium authority respect	High liking by association	Medium authority respect	Low liking by association	Medium authority respect

3.8.2 Dependency

The empirical study revealed that there was two additional dimensions to consider during a dependency-analyse of a R&D-collaboration, (6) inventories/facilities and (7) competitive advantage, combined with the five previous suggested dimensions in Chapter 2.4 – *Practical implementation of dependence theory*:

Table 15 Additional dependency dimensions

Dimension	**Description**
Inventories/facilities	Are the company dependent on external facilities in order to develop the product?
Competitive advantage	Competitive advantage: to which extent does a collaboration with SINTEF provide the company with unique competencies/competitive advantages?

In order to use these findings and analyse the dependency relation between our respondents, we have developed an analytical framework called *The Seven Dimensions of Dependency*. The framework is an alignment whereas column 1 represents each of the dimensions, and column 2 consists of a description of each dimension in the specific relationship. In addition, the second column has a value ranging from low-medium-high, describing to which degree there is a dependency between the companies, as

presented in table 23-29. The values are illustrated by colours, whereas low is green, medium is yellow and high is red.

Table 16 Grading of dimensions

Low value in relation to dimension	Meduim value in relation to dimension	High value in relation to dimension
Low degree of dependency between the actors	Some degree of dependency between the actors	High degree of dependency between the actors

In order to differentiate between a dependency-relation graded low from a relation graded high, we used the extremes identified accordingly to the theory and empirical section. In other words, when determining the grades in dimension 1-5 we have used the extremes described in existing literature, and in the dimension 6 and 7 we have used the extremes identified in our study. Thereafter, we graded the dependency between the companies, and colour coded the different dimensions in order to develop an comparison sheet between the different cases.

Use of the Seven Dimensions of Dependency-model

These topics are subject to our theoretical and empirical findings combined. We have used these topics to develop an analytic tool for us to map both the encountered and actual dependency-relationship between small companies and SINTEF. This model must be seen solely as a tool to evaluate one party's relative dependency power position against a counterpart.

The evaluation tool is developed to identify different aspects by the collaborative project, in order to create awareness of the present situation. It does not contain grades or scores, and are not intended as a decision tool. It contains seven of the dimensions mentioned above, and the purpose is for us to objectively describe the actual strings in the relationships that creates dependence.

Our model is built up with the following logic:

Table 17 Example Seven dimensions of dependency framework

Topic	Findings	
Which dimension are we measuring	What did our empirical analyse tell us about the dependency between the actors, in relation to dimension?	
	Dependency Company x	Dependency SINTEF
	Which dependency- rating does the customer have in this relationship?	Which dependency- rating does SINTEF have in this relationship?

When the model is completed, we are able to effectively identify and single out the core basis of dependency which either (1) confirms-, or (2) disproves our propositions. Further, it reveals the reason for the current status, and provide us with a basis map alternative strategies with regards to (1) keep or (2) change status quo. As this is a case study, we started by identifying the level of dependency in each case, in order to compare them with each other.

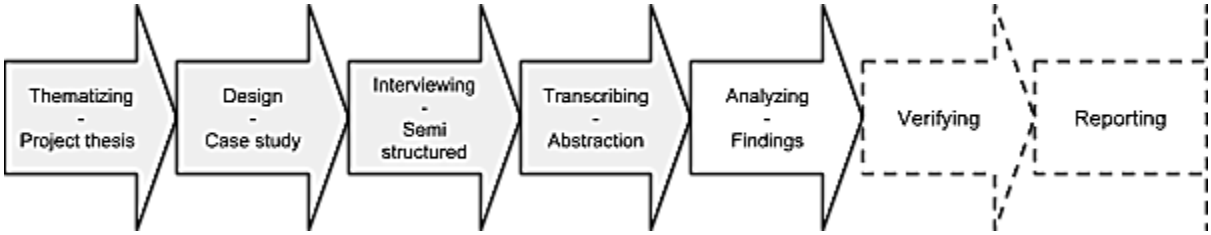


Figure 7 Seven stages of study - Analysing

3.9 Discussion

We discuss the propositions we developed in our literature review, and whether we can confirm or dismiss existing collaboration literature in relation to R&D-projects including small companies and large research facilities. To ensure that all propositions were discussed properly and equally, we constructed a framework to follow in our discussion process:

1. Introduction to the relevant proposition, and a justification of why this proposition is relevant and a discussion of the actuality of the proposition.
2. What findings confirms/disconfirms this proposition?
3. How does existing theory explain our findings?
4. To which degree are we able to conclude whether there is a match between existing theory and our findings? Are we able to tell why it is a match or mismatch?

In order to present recommendations for both the project owners and SINTEF, it was important for us that we investigated how the theory can explain the practice of the interviewees, and if there are adaptations or reflections one should do when in a product development collaboration. Lastly, we summarized and concluded.

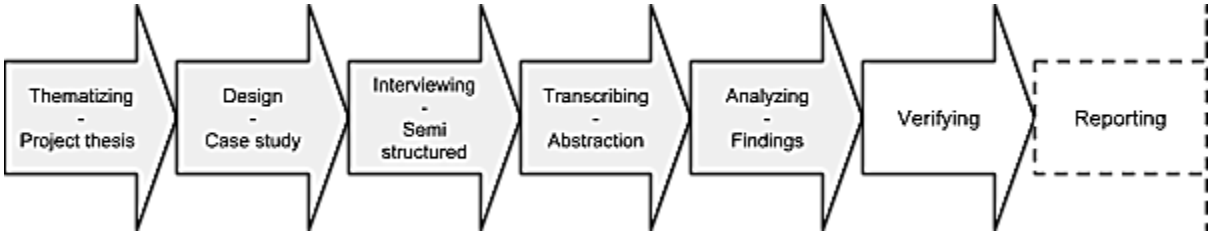


Figure 8 Seven stages of study - Verifying

3.10 Conclusion

In Chapter 7 – *Conclusion, Implications and further research*, we discuss whether we can come with a conclusion regarding research questions and whether our findings have some implications on existing theory. In addition to presenting practical and theoretical implications, we present recommendations for

actors involved in an R&D-collaboration. The recommendations are based on our research and direct feedback from interview subjects. Based on discoveries in this thesis we also recommend further research covering areas we were unable to cover, or even suggestions on how to improve / validate our results.

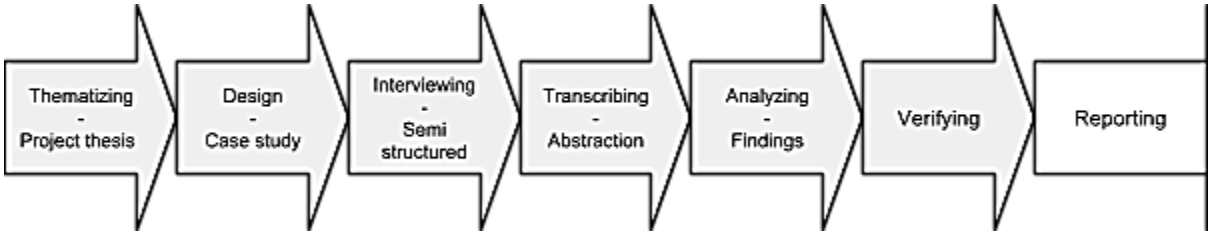


Figure 9 Seven stages of study - Reporting

3.11 Reflections

As students at NTNU School of Entrepreneurship, we are involved in our own start-ups and side-projects demanding our attention even when in the process of completing our Master Thesis. Staksrud Hansen's company has been abroad several times related to Norwegian Research Council networking events, and the company have experienced great traction from large corporations situated in Silicon Valley. In addition their company has had massive focus on product development and are in the process of a strategic acquisition negotiation. Gjølme has been the national coordinator and organizer of ClimateLaunchpad 2015, Europe's largest cleantech business idea competition, where a Norwegian participant won the whole competition beating 750 start-ups from all over Europe. In addition, Lars Gjølme worked as student assistant, mentor and promoter for Venture Cup Midt-Norge the spring of 2015, and his start-up company has been busy working with funding and technological verification combined with tractions both in the market and potential strategic collaborators on a technological level related to development.

Although both has somewhat had time to work on the Master Thesis in between or in parallel with other responsibilities - working together simultaneously has rarely been possible. This has resulted in inadequate planning, poor execution, and bad coordination and assigning of work to be done. In Chapter 8 – *Reflections* we elaborate on our difficulties and present our experiences through an academic view so that other students, especially at NTNU School of Entrepreneurship may avoid a troublesome research process such as ours.

3.12 Critique of thesis

In this thesis, we have used case study with a descriptive design in order to describe a self-experienced situation. The definition of case study is, according to Yin (2009):

The essence of a case study, the central tendency among all types of case study, is that it tries to illuminate a decision or set of decisions: why they were taken, how they were implemented, and with what result (Schramm, 1971 – citied in Yin, 2009)

In the beginning of this thesis, we faced the obvious question: which research design we should use in order to answer our research question. We were standing between several choices, such as qualitative or quantitative, experiment, survey, archival analysis, History, Case study or another approach. We concluded that case study would be the most suitable approach in this thesis. To argue for our choice, we look back at our definition of case study. If we break it up to three questions, we find some questionable reasons for us to choose case study in a descriptive research design. The questions to ask before choosing case study is: *why where decisions taken, how where decisions implemented* and *with what result?* First and foremost – why and how questions are in general considered explanatory questions, which are likely to lead to the use of case studies. However, we chose a descriptive design, which creates a mismatch between basic methodology theory (Yin, 2009), and our practical approach. The reason we ended up with this approach might be explained by two different factors;

(1) The situation we wanted to investigate was self-experienced. Hence, we presupposed that the challenges in collaborations involving small enterprises and research institutions was real – or present. With that in mind, we did not consider to do an exploratory investigation. In addition, we did not have enough existing literature stating how the relation normally occurs in terms of power dynamics and responsibility delegation in such collaborations. That made it naturally to describe the situation, before further research might explain why participants in a collaboration behaves one way or another – based on our findings.

(2) There is a resource question to consider in this thesis. We had limited time and limited access to secondary data material, which made it hard to trace the cases over time. This made it hard to develop an ingoing explanatory study, and yet again, we ended up on a descriptive case study.

Further, case studies are an appropriate approach if the research fulfil three criteria's (Yin, 2009):

1. The research question seeks to answer *how, why?*
    a. Our research question seeks to describe a relationship, and we are investigating how this relationship develops, and why it develops in that way
2. The environments does not require that we control the behavioral events
    a. We do not control the behavioral events in the cases, and have to use both primary and secondary data to answer the research question

3. We have to evaluate the degree of contemporary as opposed to historical events
    a. The cases we are comparing in this study are project based, and thus contemporary.

In general, case studies are considered one of the most challenging of all social science endeavors (Yin, 2009). Case studies appears to be subject to some tension between researchers within different fields of studies, and several social researchers only acknowledge case study as an appropriate approach in the exploratory phase of an investigation. Thus, they do not acknowledge that case studies are appropriate in order to test propositions as we have done in this thesis, and as a result, they believe that case studies are an inappropriate investigation form within descriptive studies. However, Yin (2009) refers to several famous descriptive case studies within major disciplines such as sociology and political science.

3.12.1 Literature study

The subject we researched is at this point well defined, but the scope of the research might be too comprehensive and the boundaries of theoretical basis still needs to be set. The thesis will contribute to setting the scope for further research dedicated to be an empirical study. Literature reviews so far has shown that quite few, if any, have researched the subject until now. Confirmation that the subject is relevant must be generated through an empirical study. One plausible factor that affects the validity with this approach is that some relevant articles and theory might be lost due to lack of uncovered terminology and time limitations regarding reviewing all articles.

As described in the preface, the basis of this research is personal and thus, avoiding bias was important. By investigating existing theory in wide searches, we aimed to uncover all unknown aspects of the theory, reducing bias. The unstructured literature search allowed us to identify many terms and fields of research showing that small enterprises is an important and wide topic and that they are highly involved in R&D collaborations. The wideness also resulted in several different theories being reviewed, but maybe not enough in depth - a result of late definition of what theory was relevant for the research. Being stricter early about what should be disqualified as irrelevant literature, may have resulted in a better overview and depth for research in some fields. However, the wideness in the scope is what proves that there is little research in the field of small enterprises and research institution based contract research. To ensure all literature was revealed, other academic search engines could have been used. Excluding research based on specific industries or disciplines may have excluded findings supporting/disproving our assumptions, but our research is focused on general data and not comparing different industries.

3.12.2 Selection of cases

Having several cases makes this a collective case study, and our cases have similarities based on the scope of our research and being relevant to the phenomenon (Tjora, 2010). This gives us more validity.

The cases involved in this study are chosen by recommendation from SINTEF combined with a somewhat haphazard availability. This is a problem for the research, both because the recommended

cases might be examples of collaboration that SINTEF have special relations to or certain experiences with that they need researched, or that they simply are not representative for the portfolio of small business in SINTEF's customer base. This gives us reason to believe that there might be other cases available for research, which may give a new perspective to our research topic.

3.12.3 Methodology

Our research method evolved to be more exploratory than planned, as the purpose is to discover new dimensions of the research topic (p. 112, Kvale & Brinkmann, 2009). We had propositions in the beginning that were dropped as the project proceeded (p. 103 Tjora, 2010). It was important for us that we focused on what the conversations/interviews with the representatives from each organization gave insight in as we touched upon several subjects in the interview. The subjects with the most researchable content were chosen as focus areas; dependence and influence were the clear choice here. This selection gave us the opportunity to use what the informants told us as a significant source of refinement of the research as it progressed (Tjora, 2010).

The interviews were to a certain degree open and non-standardized resulting in method first appearing in the investigation (Kvale & Brinkmann, 2009). To us this meant that we needed to form codes prior transcription. This resulted in revisiting theory for code-development. This method, partly inspired by "grounded theory" and inductive, gave us the chance to perform a second literature review with more directed relevance to our topics influence and dependency. In addition, it made coding easier as we preselected code-entities instead of developing these from scratch based on interviews. For example: we identified some categories on a more specific level before the interview process started, thinking that some coding could be done during and directly after the interview. However, transcription combined with the impressions from the interviews convinced us to do a preliminary sorting with focus on meaning units.

4 CASE PRESENTATIONS

This chapter will give a description of each case involved in this research. Four cases were researched, and nine interviews were performed to get insight to both sides of each case. Anonymity has been promised for all cases, and thus the presentation of the cases will be brief with a detail level not revealing identifiable matters. Based on the background of the organisations, their representatives and varied the fields of expertise they are involved in, we have found them comparable in the following dimensions:

- Project duration
- Customer experience with product development
- Funding

However, as we will present below, even though all of the companies fulfil our initial criteria, we found some significant differences between all the customer companies. For instance, small but established enterprises are different from entrepreneurs and start ups when it comes to resources. This finding and other will be presented in Chapter 5.2 - *Dependency*. This will be further discussed in Chapter 6.2 - *Dependency*, 7.1 - *Conclusion of the thesis* and 7.4 - *Further research.*

Table 18 Interviewee details

Case	Tech type	Interviewee organisation	Interviewee experience*	Education	Interviewee ID**
A	product	SINTEF	High	Engineering	SA
A	product	Customer	None	Specialization	CA
B	product	SINTEF	High	Engineering	SB
B	product	Customer	Medium	Business(?)	CB
C	product	SINTEF	High	Engineering	SC
C	product	Customer	Low	Business	CC
D	component	SINTEF	High	Engineering	SD
D1	component	Customer	Medium	Engineering	CD1
D2	component	Customer	Medium	Business (?)	CD2

**Details regarding levels of experience is described in Table 15*
*** The ID is used to give reference when quoting, paraphrasing or generally referring to the interviewee subject in the thesis.*

Table 19 Comparison sheet project experience

No or little experience	Medium experience	High experience
Companies within this category has managed 0-1 previous R&D projects	Companies within this category has managed 2-4 previous R&D projects	Companies within this category manages R&D projects routinely

This thesis is investigating whether it is power asymmetry between small enterprises and a large research institution, and how this affects the project. All of the companies we have interviewed fulfil the criteria presented in Chapter 1.7 – *Definitions - Small Enterprise(s)*, both the customer and R&D-

performing partner. In addition, all of the cases have substantial research challenges, and consists of small enterprises performing R&D in collaboration with a large research institution.

All of the small enterprises in our empirical study have limited resources. In this thesis limited resources means limited financial resources, human capabilities (e.g. technical competencies or experience), or inventories/facilities. In addition, there is an urgency-aspect with product development processes to consider for small enterprises. All of those previous mentioned factors are usually critical parts of a R&D product development process. This creates a gap between (1) a small company's ideas, and (2) their ability to realize these ideas.

In order to cope with this gap, our respondents has chosen to outsource part of their *new product realization* process to the Norwegian R&D-facility SINTEF, which automatically puts the company in a position where they are dependent on a second company. Our initial assumptions was that this dependency-aspect has the potential of creating an asymmetric relationship between R&D-partners in the project. However, we want to underpin the important conclusion in our theoretical Chapter 2.1.1 - *Power Relations*, stating that an asymmetric relationship might be both beneficial and/or harmful for the collaboration.

These projects differ from traditional industry collaborations in the sense that they are tied up to non-diluting grants from the Norwegian government, and has to proceed through a fixed set of stages - and gates processes in order to continue to receive grants. This creates a common ground for all participants in a consortium, and ensures that there are some contracts based dependency as long as the project runs. It is most common that this stage-gate process is related to the milestones and the progress plan described in the project application. As small enterprises usually has limited financial resources, they are highly dependent on the public grants in order to conduct R&D-projects (www.forskningsradet.no).

Case A

In Case A SINTEF was approached by a business seeking to improve the life of persons with a certain handicap. The product development focused on enhancing the communication between the medical specialist and the user of an aid product. The R&D-project was developing a physical device for easier communication, more manipulation alternatives and a more reality based fitting of the aid product. The goal was to make the end user of an aid product more involved in the rehabilitation process by getting a closer and better communication with the medical specialist. The company was a small business. It has a turnover of slightly 6 million NOK annually. The Norwegian Research Council funded the project. The company was founded early 2006, and had their first positive EBITDA in 2013. Figure 10 on the next page shows the finances of Company A.

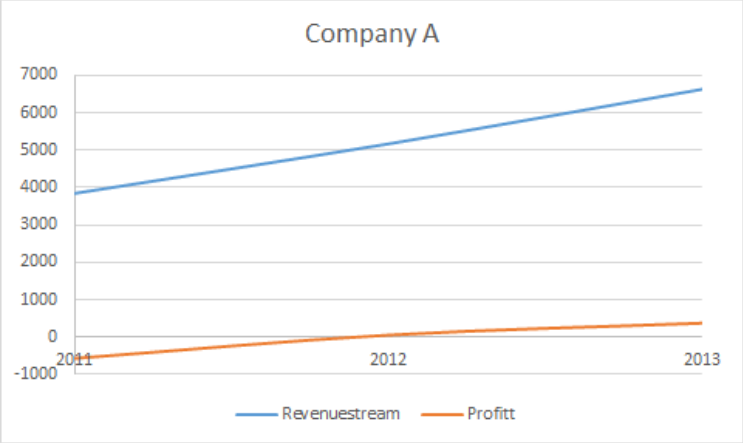


Figure 10 Case A Company Finances

Case B

In Case B SINTEF approached the company to involve them in a project. The company delivers tools for inspection of installations of important infrastructure. They use advanced technology for uncovering errors or weak points in the installations. SINTEF invited the company to join an R&D-project for a new inspection tool enabling the company to perform inspections on systems with smaller dimensions than before. The R&D is done in collaboration with other engineering and research companies, but the company interviewed has the role of the customer. The company was founded in 1999, has 10-15 employees and has only had positive EBITDA in two occasions.

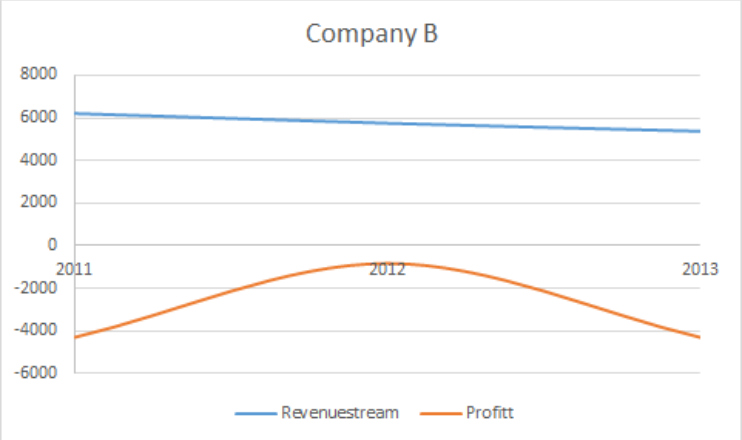


Figure 11 Case B Company Finances

Case C

In Case C SINTEF was approached by a small company with an idea to create an app with the potential of aiding people with a certain handicap. The Norwegian Research Council funds the R&D, and the product is to make a solution more available and affordable than available aids today. Aid products today tend to take time to be delivered due to manual personalization and the need for a specialist to do the fitting. The customer is a renowned Norwegian entrepreneur, but the company has no historical data

regarding sales, revenue or EBITDA. Even though, it might prove that the project owner has some experience. No finance data is available.

Case D

The R&D-project in Case D is an automatic system for control over a large moving object. The customer is a producer and supplier of manoeuvring engines. The idea of making the system came in dialogue between SINTEF and customer representative. The project is not funded, but it has an end user of the who is paying for the development. The company is owned by another Norwegian company, and acts as a subsidiary company. There is no economic data to find about the spin-off, but the mother company has a revenue of over 100 MNOK and an EBITDA over 1 500 MNOK.

A comparison of the different cases in relation to dependency and resources are carried out in *Chapter 5.2.2 – Case Comparison – The Seven Dimensions of Dependency model*, and will illustrate that even though there are many similarities between our respondents, there are also several noticeable differences. These differences might be appropriate to distinguish between and separate in further research, as discussed in *Chapter 7.4 - Further Research.*

5 FINDINGS

This chapter will present the empirical analysis concerning the two research subjects dependency and influence. For each main topic, influence and dependency, we present the related propositions as sub-chapters. Each sub-chapter is introduced with the relevant table showing our condensed findings, which then is followed by our reasoning based on the empirical data from the interviews case by case. For each main topic there will be a summarising chapter and a presentation of our general observations to give insight in the totality.

5.1 Influence

As explained in Chapter 2.2.2 –*Liking principle (Association)* we have divided the research question regarding influence into two more nuanced research questions, which again are represented by five propositions. We present the findings related to their main principle of influence in the chapters below, and follow up with a summary of the whole impression of the empirical data through the view of influence.

5.1.1 Small businesses in collaboration with SINTEF will express high liking of the research organisation

Table 20 Level of Liking expressed by customer

Customer expressing liking of SINTEF				
Representative	Case A	Case B	Case C	Case D
Level of liking	High	Medium	High	High

Case A

The interviewee explains that SINTEF recognises the needs of the small enterprise and adds to the value of the R&D by contributing not only with technical expertise related to the making of the product, but also with guidance regarding application for funding, business strategy development and choices for technology. In addition, the scientist is perceived as engaged on a personal level, which is highly appreciated and well liked.

"I'm very lucky to get a scientist who is very engaged… And wants to work with this project full time… He invests a lot of effort and supports us in many applications, not only for the Research Council. He's very skilful." – CA

The interviewee cannot picture collaborating with another organisation at this moment. However, the customer has learnt that not everything happens automatically, and that milestones and deadlines must be set in order to have progression.

Case B

In case B, the company is familiar with SINTEF through other relations. *"Regarding SINTEF, we know them from other relations and generally because they're Norwegian."* – CB. They are aware of that one needs to set claims, but realistic ones. They perceive that SINTEF is always working to find the best solution, and they are interested in learning about the customer's experience and knowledge from the realistic world. The project might be a bit affected by the fact that the customer was not involved in the application process regarding funding. Compared to case A the degree of liking is not as high, possibly because the scope of involvement from SINTEF is purely related to the development and not surrounding elements. The liking is therefore categorised to medium, as the customers seem not as involved or enthusiastic about the project, despite the fact that the interviewee expresses positive attitude towards the research organisation.

Case C

The interviewee regards SINTEF as highly knowledgeable and professional, contributing with great value in the R&D-project. The wide range of expertise is also appreciated. SINTEF was also perceived as highly enthusiastic when presented with the project. As in case B SINTEF is described as aiming to present the best solutions for the customer. A gratefulness towards SINTEF based on their financial risk taking is also expressed during the interview. We categorise the liking as high as the interviewee has many positive remarks regarding collaboration and especially the talent and knowledge of SINTEF.

"They were very enthusiastic wanting to engage themselves in this project. Not only as supplier of competence on hourly basis, but also by taking a business risk in the project." - CC

Case D

As in Case C the expertise of SINTEF is highly appreciated. The good communication and level of understanding of customer needs are highly valued. Similar to Case A SINTEF is perceived as very insightful and helpful regarding the application for funding. The opportunity to work with a "neutral" partner instead of a competitor is also seen as positive, especially becasuse the level of contribution is perceived as personal enthusiasm. In addition being renowned increases the liking, both SINTEF and the previous work of the scientist. Thus, the liking is categorised as high also in this collaboration.

"SINTEF had experience with the [main technology] system, and the representative has worked in a renowned engineering company, and has experience with [main technology] and has contacts here… so then it was natural to approach SINTEF, and they are located in Trondheim, and only proximity makes it natural to establish a collaboration." - CD

5.1.2 SINTEF will have perceived a high liking from their customer.

Due to too little empirical data, we choose to end the research regarding Proposition 2. In general, there is little evidence of SINTEF perceiving a high liking by association. This is not necessary because the

customer shows no signals of liking, but SINTEF representatives may be reluctant to express that they are liked, making it hard to identify in the coding process, or the questions in the interview guide may not be direct enough. The confirmation in 5.1.1 shows that there is a high degree of liking from the small companies to SINTEF, despite the lack of data to confirm/disproving it when investigating proposition 2. In Case D we find signs that showed the potential in the scientist experiencing liking from the customer: *"One of the reasons they had such faith I think is that SINTEF has such a renowned name…If the customer takes a risk too great because of the faith in SINTEF, and it turns into a failure, that's not fortunate"* - SD

5.1.3 SINTEF will express a high degree of liking their customer

Table 21 SINTEF liking customer

SINTEF's expressed liking of customer				
Representative	Case A	Case B	Case C	Case D
Level of liking towards customer	High	High	High	High

Case A

We made some remarkable discoveries related to liking from SINTEF's perspective. Working with an entrepreneur causes the scientist to go "the extra mile" in customer service: *"It's very cool I think, participating on the inside of a small start-up and observe how this works. It is very motivating [...] It might be me, because I find it exciting to realise new ideas, so I initiate a lot of this...I have discovered I like this hefty dynamics. It gives me a lot."* – SA. This was similar in case D; *"That's how it started, very haphazardly and very sporty initiative."* – SD

Case B

The scientist expresses liking by similarity because employees in the customer company are engineers and could compare this experience to working with larger customers; *"I would say that meeting an engineer environment is similar to most larger projects. It's an equal way of thinking […] Pretty similar enthusiasm (interest)."* - SB

Case C

The problem the business solves causes SINTEF to like the customer, as the intention of enabling their expertise might aid people with a certain handicap; *"It's positive that someone wants to invest and develop something in that direction. And that's why we are willing to stretch so far. When I get the phone call with the request from the customer, I get happy and inspired."* - SC

Case D

Here it was a matter of being trusted and being acknowledged for competence, which combined with the entrepreneurial spirit of the company made SINTEF like the customer; *"It was very alright that they*

had that great level of trust, and didn't meddle too much. In fact, they counted on us this being our field of expertise so we got to keep on doing what we were doing…" - SD

5.1.4 Small customers of SINTEF respect their authority as an expert, and often surrenders decision making to the scientist(s)

Table 22 Customer surrendering decision making to SINTEF

Customer respect SINTEF's authority and surrenders decision making				
Representative	Case A	Case B	Case C	Case D
Level of surrender due to authority	High	Medium	Medium	Low

Case A

In case A the customer representative explains how SINTEF's experience in the field of applying for funding has been crucial to the progress. Most of the activities regarding decision making in the progress of R&D has been performed in dialogue with SINTEF, or even by SINTEF. There is one responsibility that clearly stands out; recruitment of users and end users for testing. All other activities are regarded as a part of the service SINTEF delivers. In other words, we would say that decision making often is inspired by or performed by SINTEF, causing us to believe the small business surrenders decision making to the experts. We observe that there might be some difference in what the customer expects to be delivered, and what SINTEF actually deliver as a research institution. Through the process the customer has learned that it is not enough only determining responsibilities in a contract, one must set deadlines. We categorise the level of surrendering authority as high.

"We participate with input on how it should be, and SINTEF has their job of developing it and present new solutions. [...] My role is as coordinator. In addition I have follow up meetings with project leader who is SINTEF, where we review further work [...]I have no experience with this type of project which we are involved in with SINTEF… And without SINTEF we wouldn't have managed" - CA

Case B

There is a great deal of trust from the customer to SINTEF in Case B, as they state their claims and wait for SINTEF to fulfil them. They are clear on their part as presenter of claims, and are not as dependent on SINTEF as the company in Case A. They are of course willing to discuss the claims, if they seem unrealistic in the view of SINTEF. They also expect SINTEF to deliver suggestions from a market point-of-view, not only a technological point-of-view. Overall, they express a very democratic process, where dialogue is the key to finding the best solution, meaning they let SINTEF have a lot of influence based on the expected experience. We categorize the level of surrendering decision making to medium as the expectations of well-founded suggestions is high from the customer point of view. This shows that they are controlling the decision making, but still use SINTEF's input.

"It's important that they contribute with well-founded suggestions, both from a technology perspective but also from a market point of view. And I experience that they have insight in both dimensions [...] Of course, our demands must be realistic too. So, I would say it's like in Norway in general, like the Norwegian society and that everything is quite democratic." - CB

Case C

Similar to Case B the representative from Case C is quite clear on the fact that they are the principal. Despite this, SINTEF is part taking in the decision-making because it is done through dialogue and discussion. The difference from case B lies mainly in the expectation of market knowledge, because the customer states that this is not part of SINTEF's responsibility or area of expertise. They do however state that power of competence is relevant in such a collaboration, including the technological aspect. We set the level of surrendering decision making as medium, as the representative clearly has most influence from the market perspective, but still is compliant with input from the technical aspect of the project.

"We've been sitting at the same side of the table. I think it's quite important if one is to have good creative processes and a collaboration, and SINTEF naturally facilitate for that…. They are an agent who wants their customers to be satisfied with the collaboration […]." - CC

Case D

As in case C and B there has been dialogue regarding the technology solutions, but the representative here is explicitly clear that the principal makes the decisions. The focus here is separating who has responsibility for what part of the product, because SINTEF only develops one part of the total product. We categorize the level of surrendering authority as low, as the SINTEF part of the project is limited to one element of the product, and the customer setting specific claims to both functionality and type of hardware.

"We do what we want because it's our product and we decide what it should do and which functionality we want from it, so we have full authority [...] It's clearly the one with the money who's got the power, so it's the procurer of services and the product who has the power." - CD

5.1.5 SINTEF representatives must often act outside their responsibility and administrate the process to ensure progress

Table 23 Perceived level of authority compliance

SINTEF act outside their responsibility and administrate process				
	Case A	Case B	Case C	Case D
Perceived level of authority compliance	High	High	Low	Medium

Case A

From the review of the interview data, we can interpret that the customer has a lot of trust in SINTEF. Given the structure of communication described as flat, where SINTEF suggests and the customer accepts, it is reason to believe the customer gives SINTEF influence based on their title or knowledge. They are also often given the authority to administrate and solve tasks outside the scope of R&D. SINTEF experiences this and even reflects upon the fact that their advice very often is chosen fast and that it could be a dangerous habit. We categorize the perceived level of authority from SINTEF's perspective as high.

"It's about taking many roles all the time, and doing a lot on behalf of the customer which we strictly speaking shouldn't be doing. If you look at the project plan it's not my role to work with financing, or strategy and organisational development but I sort of get sucked into it in this project." - SA

Case B

Case B shows a customer more aware of their role as a project owner deciding the claims of the project, however they still seem to give SINTEF a certain trust, both in expectations of end results and execution. They still respect the knowledge, expertise and problem solving capabilities at SINTEF, but instead of just letting them work independently on several levels, they present higher demands of them expecting more than SINTEF may be able to deliver on R&D, within the scope and resources of the project funding. In other words we consider the customer of case B to have similar thoughts of SINTEF's expertise as in case A, but do not show the same signs of giving the total influence abilities of the process, strategy and company organisation, but they do however still retire and expect results based on the claims. SINTEF then gets total influence on the technological solution. We could also read about SINTEF and the customer being in dialogue to adjust the requirements of the project and thus categorize the level of influence by authority perceived by SINTEF to high.

"They may have had that attitude, as there isn't a lot of money - project funding for [the customer], so they were pretty clear on that early, that: "Now you must work, and we'll withdraw from the project." - SB

Case C

There is no doubt that SINTEF experiences great trust from the customer. The informal approach from the customer or undefined goal might actually be another signal of trust, letting SINTEF take full responsibility for a new task. Even in decision-making, SINTEF representatives are considered valuable presenters of data to show the possibilities of including new elements. However, the democratic decision making, combined with the desire to include new directions from the customer side makes the scientist feel a bit lack of control, so we cannot say that SINTEF perceives anything, but low authority and responsibility of ensuring progression.

"He is the paying customer… We do everything within the frames of what we understand to satisfy his demand [...] Well, we are commerce - if he says "let's do it" so… But of course; we try to say that we are honest, and if we don't believe him - we must step on the breaks." - SC

Case D

The level of authority compliance experienced by SINTEF is medium. The process is not as "all over" as in Case C, but there are still elements that clearly are not left in the decision-making role of SINTEF. The customers high experience, both related to market and product development lets them decide nearly everything. There is however only a small part of the project that SINTEF has responsibility of, but it included technical issues regarding hardware choices that the small company had to set claims for. As the scientist expresses; they are quite experienced compared to other, but SINTEF would need to contribute if the customer was inexperienced.

"These people have worked in the business many years...but for a smaller company with much less and limited experience in development methods and so on, I think SINTEF has a role in contributing to make it a reasonable process." - SD

5.1.6 Summary and general discoveries

Table 24 Complete Influence Table

Expression and perceivance of liking and compliance of authority								
	Case A		Case B		Case C		Case D	
	Customer expressed	SINTEF perceived	Customer expressed	SINTEF perceived	Customer expressed	SINTEF perceived	Customer expressed	SINTEF perceived
Liking by association*	High	Low / Undefined	Medium	Low / Undefined	High	Low / Undefined	High	Medium
Compliance by authority**	High	High	Medium	High	Medium	Low	Low	Medium

**Defining proposition 1 (Customer perspective) and 2 (SINTEF perspective)*
*** Defining proposition 3 (Customer perspective) and 4 (SINTEF perspective)*

Table 25 Research Questions and related empirical finding

RQ #	Research question	Empirical finding
RQ2a	What is the typical level of liking ampong the partners of an R&D-collaboration?	High level of liking by association
RQ2b	Can we observe the authority role of the expert influence the small business?	Partially: SINTEF may heavily affects decision making in the R&D-process involving inexperienced customers
RQ2	How is the power distribution between the research institution and customer company in relation to influence?	The small company will share power in the R&D-process by giving SINTEF influence

SINTEF is clearly both liked by the customers and they also like working with their customers. Working with small companies results in a mentoring role as well as deliverances on the technological

development, especially if the customers are inexperienced with these forms of technological development. One of the signs suggesting that the customers were inexperienced is the fact that they only during the progress discovered that SINTEF would deliver results based on specified claims or a clearly expressed demand of execution, and not based on a dialogue.

SINTEFs role as the expert gives them high influence on many aspects of the company, from business development to product development. It is in their own interest to assist the customer as much as possible, both regarding reputation and their own success rate. An important factor that convinces the customers to trust SINTEF is the level of commitment SINTEF is able to present during the progress. All customers are satisfied, and to some degree impressed over the effort SINTEF had in the progress, especially on the capacity of involving themselves in other aspects than the research. Inexperienced in project management, blinded by trust and with the expectation of SINTEF being capable to deliver a satisfying product ready for market, the small businesses gave an impression that SINTEF had a strong influence on which direction the project should take and what decisions the project owners should take.

When asked who the decision maker was in the process all interview subjects named the customer or project owner. They were the ones who could "terminate or initiate" the process. Both SINTEF representatives and customers had a firm opinion on that, but the decision making on technology matters was regarded as democratic and dialogue based according to both sides. SINTEF played a more important role, than they were used to with large enterprises and were to some degree involved in decision-making based on market and business knowledge, which shows that not only their scientific expertise is utilized, but also their experience and insight developed in other projects. The project management experience of SINTEF combined with their technological insight can contribute in the progression of product development. The customers should represented the market knowledge (end user needs) and SINTEF the technological expertise (solution possibilities).

They had great expectations to the quality of the input SINTEF had as they are an institution of good reputation and has to deliver on multiple levels. Meaning deliveries according to claims in the project description, but also counselling / decision making on technology, business strategy and market knowledge Quite often the expectation of the customer was that there should be a finished product, ready for market. SINTEFs representatives confirmed this customer expectation as they used expressions such as "unrealistic expectations and goals". Sometimes the course of the process had to be altered or one had to accept that the result might not be as one had expected. SINTEFs experience and reputation often resulted in the small businesses taking it for granted that the scientists had more responsibility and tasks to solve in the project. SINTEFs own impression is that they are to research and be a part of a team of technological experts. In some cases, they ended up with performing additional tasks, such as the search for financial resources, including applying for research programs etc. The entire development was often left to SINTEF in whole as the entrepreneurs often lacked experience, both with project management and technical insight.

5.2 Grading Dimensions of Dependency

In this Chapter, we are presenting our grading system, which helps us define the dependency-relation in each case. To determine the scale of our grading system, we used values found in either our literature review or empirical findings, or both in combination. The grading scale is always divided into three grades. There are 7 different dimensions, and thus 7 different grading scales. Beneath is a description of each one of them.

Project experience

In order to analyse project experience, we have used the extreme values found in our empirical study, showing that the project experience ranging from no experience at all, into multiple years of experience with managing R&D development processes simultaneously. However, the median was ranging in the mid-section, showing 2-4 project performed prior to the projects we are investigating. Assuming that most R&D-projects at least takes 2-3 years to perform, this mid-section counts for 4-12 years of experience. It is important to notice that this might be somewhat misleading statistics, as e.g. SINTEF representatives usually works with several R&D-projects simultaneously. We have however made a grading that ranges the project experience between the different actors in the different cases, in order to compare each actor in the case, and the cases against each other.

Table 26 Comparison sheet project experience

No or little experience	Medium experience	High experience
Companies have managed 0-1 previous R&D projects	Companies have managed 2-4 previous R&D projects	Companies manages R&D projects routinely

Also presented as Table 17 in Chapter 4 – Case Presentations

This dimension is important to investigate, as most R&D projects are complex and hard to manage. Previous project experience are thus important to investigate in order to see how dependent each part is on the other to conduct such projects.

Technical expertise

In order to analyse this technical expertise, we have used the extreme values found in our empirical study, showing that the technical expertise ranging between “no expertise within the technological field” to “world leading expertise within the technological field”. In between these extremes, it was usually “some degree of expertise”, indicating that the company to some degree could develop the project by themselves or, obtain the necessary technological understanding to develop the product. However, this would be in accordance with time consumed and/or quality.

Hence, we analysed each case based on the following logic:

Table 27 Comparison sheet Technological Expertise

No expertise	Some expertise	World leading expertise
Companies are fully dependent on a R&D performing part to develop the product	Companies possesses capabilities to perform the R&D-related activities themselves, but with lower quality and would spend significantly more time on the project.	Companies do not rely on a collaborative partner in order to develop the product

It is important for each part to be aware of their technological capabilities, as this is crucial in order to determine one's dependency towards the collaborative party. Here, it is important to remember that SINTEF is to be considered as a semi-commercial company, that usually uses project results to do further R&D and commercial activities. The empirical study also revealed that SINTEF in some cases do not have the necessary technological expertise to develop products, and has to acquire knowledge in order to help customers.

Alternative outsourcing

We have used the extreme values found in the empirical study in order to distinguish between different degrees of dependency towards one parts counterpart. What we found was that the customer rarely had investigated potential other collaborative alternatives, but instead chosen SINTEF due to their (1) reputation, (2) the location, (3) previous experience with SINTEF or (4) the competitive landscape. However, most of the respondents expressed that other potential collaborative partners probably could perform the same level of quality as SINTEF. In most of our cases, the customer approached SINTEF, except one case, and it is thus hard to conclude SINTEF's dependency towards the customer. To analyse this, we have collected SINTEF's responses about their conception of the customers' knowledge base, and how the project would evolve if there were another collaborative partner. What we found was that there was a significantly difference between the cases with regards to (1) to which degree each part had investigated potential opportunities, and (2) to which degree each part had alternatives in relation to alternative collaborative R&D-partners.

Table 28 Comparison sheet Alternative Outsourcing

No alternative partners	Some alternative partners	Multiple alternative partners
Companies have or no alternative partners that are to be considered as real options to perform R&D-related activities	Companies havesome alternative partners to perform R&D-related activities	Companies have several alternative partners to perform R&D-related activities

This is important to investigate, as alternative outsourcing opportunities provides each part with (1) bargaining power towards the counterpart, and (2) leveraging power during the project period. Combined, these two factors are evaluated to be important factors to determine each parts dependency towards the counterpart.

Urgency

This dimension is based on our literature review, whereas as the urgency aspect states that relationships develops differently based on the time pressure in the project. Thus, relationships that develops in a short period, such as between small enterprises' and research institutions, needs more formal planning and organization in contrary to naturally developed relationships (de Wit & Meyer, 2010). This might be explained by the limited resources acquired by the small enterprises, whereas research institution consider small enterprises as a short-term relational partner. In addition, the research institution possesses high competencies that are hard to acquire from other suppliers, which ultimately puts the research institution in a position with a high degree of leverage and bargaining power. Hence, we analysed the urgency dimension by looking at the need for fast execution of the project. What we found was that in none of the cases, there was a need for urgency at SINTEF point of view, but that it differs somewhat between the customer cases. We divided the urgency in three categories:

Table 29 Comparison sheet Urgency

No degree of urgency	Some degree of urgency	High degree of urgency
One part has no noticeably urgency, and are satisfied as long as the project reaches the planned milestones	One part is dependent on efficient execution in order to obtain or maintain competitive advantage	Companies are reliant on the counterpart to react on immediate needs in order to deliver products to customers

As SINTEF in no cases had the urgency aspect, it is important to see in which cases the customer had an urgent need, and how this had an impact on the dependency towards each other.

Financial resources

In order to analyse this dimension, we used our literature review in order to identify the challenges related to limited financial resources, and how this affects a company's dependency towards cooperative companies. Further, we used the extremes found in our case study to classify different financial statements in each company, in order to assess the financial situation between each case. E.g. Case A, where the funding allocated to SINTEF is relative low, compared to SINTEF's total income. In other words, this one time collaboration has a low impact on the overall financial statements. However, combined, small companies all over the country combined constitutes a significant contribute to the total income of SINTEF, which is not taken into account. This might be subject to further research, as several theories emphasises that small companies can group together and thus create larger leverage towards large companies (Anderson, Håkansson and Johanson (1994).

Table 30 Comparison sheet Financial Recourses

High impact	Medium impact	Low impact
The project has a great impact on the company's financial statements	The project has a mediocre impact on the company's financial statements	The project has limited impact on the company's financial statements

Inventories/facilities

In this chapter, we have used the feedback provided by our case study in order to analyse the need for inventories and/or facilities one part could not otherwise get access to in a reasonable manner. With inventories and/or facilities we mean products, machines or other goods that are necessary in order to develop a new product or process, that is not reasonable to purchase in a onetime development project. E.g., SINTEF approaches and industry collaborate in order to get access to their specialized machines for testing of a new algorithm. When analysing this part, we have taken into consideration a three step valuation process, whereas High dependency imply that one part get access to inventories and or facilities they otherwise wouldn't get with reasonable resources. Medium dependency implies that it is hard to get access to a specific inventory and/or facility, but that it exists, e.g. at a competitive facility. The low dependency implies that inventories and/or facilities are within reasonable reach at other providers, or could be purchased.

Table 31 Comparison sheet Inventories/facilities

Low dependency	Medium dependency	High dependency
Inventories and/or facilities are within reasonable reach at other providers, or could be purchased.	It is hard to get access to a specific inventory and/or facility, but it exists, e.g. at a competitive facility.	One part get access to inventories and or facilities they otherwise wouldn't get with reasonable resources

Competitive advantage

This question is mainly related to the customer company's perceived competitive advantage by collaborating with SINTEF. According to our literature review, a collaboration with a research institution might create a competitive advantage. If so, the perceived dependency towards SINTEF will be strong, as elaborated in our theory chapter, during Chapter 1.1 *Social and historical context* and 2.1.2 *Relationship.* Sources to perceived competitive advantage vary a lot, but as the mentioned Chapters states, it most commonly occurs from an admiration of the research institute's superior competence, their reputation or their independence from competitors.

In order to analyse this dimension, we are using our empirical data to classify the feedback provided by our respondents into three different categories. |

Table 32 Comparison sheet Competitive Advantage

High advantage	Medium advantage	Low advantage
The customer feel they receive superior competitive advantage by cooperating with SINTEF.	The customer feel they receive some competitive advantage by cooperating with SINTEF.	The customer feel they receive low competitive advantage by cooperating with SINTEF.

5.2.1 Use of grading in Cases

In this Chapter, we will use our findings in order to analyze the dependency-relation in each of the cases. The outcome of this analytical framework will be summarized in Chapter 5.2.2 – *Case comparison – The Seven Dimensions of Dependency model.* Our analyzes are found in table 31 – 34, below.

Case A

Table 33 Seven Dimension of Dependency model - Case A

Topic	Findings	
Project experience	Company A is listed as both the administrator and the project manager. However, in this specific case, SINTEF has taken over all administrative and financial aspects by the project,due to their experience and expertise. This is also communicated by the responsible person at SINTEF's side, that he is the one with most influence on the project. Company A, on their side, seems to find this suitable, and stated that "SINTEF understands the customer's need, and delivers what we expects".	
	Dependency Company	Dependency SINTEF
	No or little experience	High experience
Technical expertise	In this case, the customer clearly lacks the necessary technological expertise to develop the product, while SINTEF has all the resources to take the concept from idea to launch. However, SINTEF had to invest significant resources in order to acquire the necessary competence.	
	Dependency Company	Dependency SINTEF
	No technical expertise	Some technological expertise
Alternative outsourcing	Company A underpins that there are other technological providers that could deliver the same product, but that he is happy with the cooperation with SINTEF. The research institution on the other hand, had little experience within the research field, and rely on input from the customer in order to develop the product. Customer A is the leading provider of their services in Norway, and are considered market leader.	
	Dependency Company	Dependency SINTEF
	Multiple alternative partners	Some alternative partners
Urgency	No signs of urgency were detected	
	Dependency Company	Dependency SINTEF
	No degree of urgency	No degree of urgency
Financial resources	The project has a significant impact on the customer's financial statements, but no or little significant impact on SINTEF's finance.	
	Dependency Company	Dependency SINTEF
	High impact	Low impact
Inventories / facilities	No special inventories required	
	Dependency Company	Dependency SINTEF
	Low dependency	Low dependency
Competitive advantage	No competitive advantage identified, besides SINTEF being considered a quality provider in the Northern countries	
	Dependency Company	Dependency SINTEF
	Low advantage	Low advantage

Case B

Table 34 Seven Dimensions of Dependency model Case B

Topic	Findings	
Project experience	Company B is listed as both project manager and project administrator. This is the first time the project manager conducts a R&D-project. SINTEF noticed this by stating that the customer expected too much from a R&D-project. The SINTEF representative had experience as an project manager in an SME before hiring in SINTEF.	
	Dependency Company	Dependency SINTEF
	No or little experience	High Experience
Technical expertise	SINTEF did not have the desired technical expertise when the project was initiated, and had to educate their employees, at their customer's expense. In addition, SINTEF is the technical coordinator. However, the customer feels that they are 100% dependent on SINTEF in this project.	
	Dependency Company	Dependency SINTEF
	No technological expertise	Some technological expertise
Alternative outsourcing	Company B knew the work of SINTEF, and found that both their previous work and the fact that they are norwegian sufficient to choose them as a partner. In addition, they felt like SINTEF was the only partner who could perform such R&D-work. They could have performed some R&D in-house, but this would compromise both quality and time. SINTEF on the other hand could choose to collaborate with competitors of Company B	
	Dependency Company	Dependency SINTEF
	Some alternative partners	Some alternative partners
Urgency	SINTEF felt that Company B had unrealistic demands with regards to products after R&D-projects. Customer B needed a product fast, but SINTEF could not deliver. Customer B acknowledge that they had "unrealistic" expectations to the outcome of the collaboration. Company B indicated that they would prefer a product ready for commercialization at the end of the project, while SINTEF had no commercial interest in this project.	
	Dependency Company	Dependency SINTEF
	Some degree of urgency	No degree of urgency
Financial resources	The project is 100 % financed by EU, and has thus limited economic impact on either side of the partnership. However, the customer will benefit of the result, while SINTEF is paid as a R&D-performing partner.	
	Dependency Company	Dependency SINTEF
	Medium impact	Low impact
Inventories / facilities	Company B is the owner of necessary facilities in order to implement the result of the project, and SINTEF thus rely on the customer to verify their research. Company B underpins their role as a facilitator. It is unknown whether SINTEF could get access to these facilities otherwise, or if they would want to have access to them. Therefore, we have considered their dependency to medium.	
	Dependency Company	Dependency SINTEF
	Low dependency	Medium dependency
Competitive advantage	No competitive advantage is identified.	
	Dependency Company	Dependency SINTEF
	Low dependency	Low dependency

5.2.4 Case C

Table 35 Seven Dimensions of Dependency model Case C

Topic	Findings	
Project experience	Customer C is listed as project owner, while SINTEF is project manager and R&D-partner. The customer has no experience with R&D-projects in collaboration with large research institutions, and has given SINTEF responsibility of the project management.	
	Dependency Company	Dependency SINTEF
	No or little experience	High experience
Technical expertise	The customer did not have the technological expertise to develop the product, whereas SINTEF had great knowledge, competence and expertise within this field. The customer states that he searched both domestic and internationally, and landed on SINTEF as the preferred partner. It is unknown whether other partners could be used. The customer states that SINTEF is not dependent on contributions from the customer.	
	Dependency Company	Dependency SINTEF
	No technological expertise	World leading technological expertise
Alternative outsourcing	Customer C states that they didn't have any alternatives with regards to other collaboration partners. As SINTEF don't rely on Customer C to develop the product, it is considered plausible that SINTEF could find other partners or develop the product themselves.	
	Dependency Company	Dependency SINTEF
	No alternative partners	Multiple alternative partners
Urgency	It is not any direct links stating that either party rely on the urgency aspect when it comes to market introduction. However, the customer somehow rely on SINTEF to work efficient in order to save money. This is not considered as a relevant factor in this analyze, as it doesn't have any direct link towards dependency in the urgency aspect, but rather evolve around the resource-aspect.	
	Dependency Company	Dependency SINTEF
	No degree of urgency	No degree of urgency
Financial resources	The project is supported by the Research Council of Norway, and company C is a start-up constantly seeking additional funding. In addition, the customer has no revenue, and rely on success on this project. The customer uses all its financial assets in this project.	
	Dependency Company	Dependency SINTEF
	High impact	Low impact
Inventories / facilities	No specialized inventories or facilities are identified	
	Dependency Company	Dependency SINTEF
	Low dependency	Low dependency
Competitive advantage	The customer feels some advantage obtained by a collaboration with SINTEF, due to their renommee and expertise. SINTEF don't feel any advantage by having a relationship with the small company	
	Dependency Company	Dependency SINTEF
	Medium advantage	Low advantage

5.2.5 Case D

Table 36 Seven Dimensions of Dependency model Case D

Topic	Findings	
Project experience	This collaboration is somewhat more sporadically than the rest of the projects, whereas SINTEF at the moment appears as a sparring partner. However, these two companies has performed both small and larger R&D-projects in cooperation previously. This suggest that both parties has extensive experience in managing R&D-projects, mostly in common. In addition, company D is a spin-off from a large Norwegian company, with an experienced management.	
	Dependency Company	Dependency SINTEF
	High experience	High experience
Technical expertise	Company D is an experienced actor with market leading products, and high competencies within the company. However, SINTEF possesses world leading competence within their field of operations. The customer believes they could conduct the project by themselves, but not with the same quality and at a significantly longer time.	
	Dependency Company	Dependency SINTEF
	Some technological expertise	World leading technological expertise
Alternative outsourcing	Company D feels that they have some theoretical options with regards to alternative partners, but no real alternative. One option would be to collaborate with competitors, or find international R&D-facilities. However, this is not considered favourable as this might lead to IPR-issues or higher costs. In addition, they have a good relationship with SINTEF, and can be sure of the competence possessed by this R&D-facility. SINTEF on their hand, feels that they learn a lot about how to think commercial in product development projects by collaborating with customer D.	
	Dependency Company	Dependency SINTEF
	Some alternative partners	Some alternative partners
Urgency	Customer D is subject to a competitive situation where they have to be adaptive and fast moving in order to maintain their competitive advantage. In addition, the products they offer demands customization in most installations, which requires SINTEF's competence.	
	Dependency Company	Dependency SINTEF
	High degree of urgency	No degree of urgency
Financial resources	Customer D finds the financial aspect of the collaboration reasonable, and compares the rates with the general market prices. As the current projects is small scale, they don't have any significant impact on the company's financial statements. On the other hand, small scale projects are rarely profitable for SINTEF.	
	Dependency Company	Dependency SINTEF
	Low impact	Low impact
Inventories / facilities	The customer is the one that facilitates test locations and practical implementation, where SINTEF usually would rely on simulations.	
	Dependency Company	Dependency SINTEF
	Low dependency	Medium dependency
Competitive advantage	The customer feel that they receive great value through their collaboration with SINTEF, due to their unique expertise and their insight in their projects. They explicitly expresses that they got added competitive advantage through their collaboration. SINTEF, on their hand, feel that they learn a lot in the collaboration, which give them great value in their research.	
	Dependency Company	Dependency SINTEF
	High advantage	Medium advantage

5.2.2 Case comparison - The Seven Dimensions of Dependency model

Table 37 Summary of Seven Dimensions of Dependency

Dimension	Case							
	A		B		C		D	
	C	S	C	S	C	S	C	S
1 Project experience								
2 Technical expertise								
3 Alternative outsourcing								
4 Urgency								
5 Financial resources								
6 Inventories/facilities								
7 Competitive advantage								

All of the projects above consider their projects as a success, and due to the lack of any visible pattern in our analysis, it is hard to find any recommendations for small enterprises to consider before approaching SINTEF. This might, on the other hand, indicate that SINTEF is a good partner in a R&D-project in collaboration with small enterprises. What we found, in general was that the customer are more dependent on SINTEF than vice versa, as expected. This will be used as foundation for our findings in *Chapter 5.3 – Dependency findings*, and discussion *Chapter 6.2 - Dependency*, where we evaluate our findings in relation to discovered theory.

5.3 Dependency findings

In this chapter, we are presenting the propositions from our literature review from a dependency point of view, and we will use our empirical data in order to compare theoretical concepts with our findings, in relation to our scope of this thesis; R&D-collaboration between small enterprises and Research Institutions.

5.3.1 Small companies perceive that they have a high degree of dependency towards SINTEF as they are partner structured

Our first proposition about dependency is found in Chapter 2.3 - Dependency, and constitutes the sixth proposition in our thesis. The proposition is based on the theoretical basis that the dependency aspect between both actors varies based on how the relationship is structured and defined. It is important to emphasize that our findings in the literature review suggest that there is a unbalanced dependency aspect, and that this occurs in *partner structured relationships*, and that unbalanced dependency is limited in *agent - principal relationships.*

Case A

The relationship in case A is characterized as a tight relationship, with frequent interaction and common goals to achieve the goal on an individual level. For instance, it is obvious that the entrepreneur is passionate about the products. However, it is somewhat surprising that the SINTEF representative is just as passionate. The SINTEF researcher stated that "[..] I *wish I could work on this project on a full time basis, and will apply for external funding in order to make that happen*". In addition, he has taken the role as project manager, and works pro-bono at the project in his weekends. At the customer side, they are thrilled about the commitment and guidance they receive from SINTEF, as their effort exceeds what could be expected from SINTEF with regards to man-hours and responsibility. In addition, the customer consider himself or herself as a coordinating partner in the project, not the project manager.

The customer states that the project would not be a reality without SINTEF due to their commitment. We therefore conclude that the customer perceive a high degree of dependency towards SINTEF, based on the conception that they are partner structured.

A statement from SINTEF illustrates the partner-structured relationship, and pinpoints that this is more than a traditional agent - principal relationship:

"Officially, it is the customer who has the power. [..]. But when it comes to practical implementation it is more distributed" – SA.

Case B

Case B is part of a complex network of consortium partners in the R&D-project, whereas SINTEF and other R&D-facilities initiated the project and asked Company B amongst other SME's to join the consortium as the commercializing actor. The customer is the coordinating actor in the network, and the "demanding customer". The relationship is predefined, whereas each part has responsibility to deliver some components to the finalized product. However, the customer expresses that "[..] *the different roles could be more precisely defined in advance of the project*" - *CB.* The project seems to have a balanced dependency aspect concerning the relationship structure, whereas we characterize this collaboration as a partnership structure. The customer do rely on the R&D-work performed by R&D-facilities, while the R&D facilities relies on the customer in order to get public funding and commercialize the product. As a conclusion, the Customer are not highly dependent on SINTEF due to their relationship orientation.

Case C

In case C SINTEF appears as the R&D-performing partner with responsibility for development and testing. The SINTEF representative is also project manager and co-owner of the customer. The customer on the contrary is responsible for financing and company related issues. This is a somewhat complex collaboration structure, as the ownership is unconventional and that the agent also have the role as

principal. However, this creates a tight relationship between SINTEF and the customer, and it is safe to assume that this project is partner structured due to both parts common goals and objectives.

The partner structure in this case seems to create a dependency relationship between the actors, as SINTEF are more involved in the project than what is expected from a traditional agent-principal relationship. Thus, we conclude that there is a direct link between the partner structure and the dependency relationship between SINTEF and the customer. However, this is a non-traditional orientation, as SINTEF stated: *"They owe us money, which is a kind of dependency. However, it is a bit special in this particular situation, as I own half of the customer" – SC.*

Case D

The R&D-project in case D is finalized, but the customer is still using SINTEF as a sparring partner when it is necessary with modifications and/or customization of the solution based on third party requests. It is a tight relationship between the SINTEF representative and the customer on a personal level, and the customer perceive the SINTEF representative's competencies as incomparable within their field of operations. However, the professional relationship is at the moment more agent-principal oriented, as the customer buys R&D services when needed, and pays per hour.

As this is not a partner-structured relationship, it is our conclusion that our proposition is false in this collaboration. There is no link between the degree of dependency and the partner structure between both parties.

"When we need customization, we call [SINTEF representative], and he joins us out in the field. Afterword's he sends us an invoice" - CD.

5.3.2 Small enterprises are highly dependent on the contribution from research institutions due to their level of expertise

Proposition 7 is to be found in Chapter 2.3.1, and states that small enterprises could not have performed the R&D-project without the technical insight from the research institution, and that this creates an asymmetric dependency relationship between the actors.

Case A

In this relationship, the customer are highly dependent on external technical expertise in order to develop their new products, as the technological challenges are medium complex. However, the technology development requires more development, rather than research, which means that the customer could have used other providers of development. This is underpinned by the fact that the SINTEF representatives had to learn how to develop this technology, and could not rely on their previous competence. In addition, the level of technological expertise that is required is considered medium, and is to be found in many potential employees.

This means that even though the customer rely on external technological expertise, the do not necessarily rely on the particular expertise possessed by SINTEF.

SINTEF stated that: "[..] we didn't have the technological expertise in-house, and had to learn how to develop this solution [..], but this is not an unique competence" – SA.

Case B

The project in case B is to develop a comprehensive and complex product, where there are several contributors, comprising both national and international companies and research institutions. Every consortium partner contributes with parts of the research and development, whereas SINTEF is doing most of the research. The customer does not have the required technical insight to perform such R&D, and this competence is hard to acquire in both potential employees and other R&D-providers, due to the experience in SINTEF. We argue that the customer is highly dependent on SINTEF in order to conduct the project.

Customer stated that: "We could never have done this by ourselves [..], and I don't know anyone who could have done it at the same precision as SINTEF" – CB.

Case C

Even though the customer states that they are highly dependent on the technical expertise from SINTEF in this project, the particular expertise this project acquire is not rare or hard to imitate. This is particularly expressed by the project manager from the customer side, who stated that "*[..] we could have developed the solution ourselves, if we hire a person with that specific skillset*" - *CC.* However, this would require a significant amount of resources from the customer side, and would probably not be favourable in the long perspective. Hence, our conclusion is that Customer C is not highly dependent on contribution from SINTEF due to alternative outsourcing, but benefits greatly from the collaboration.

Case D

In this relationship, the customer rely heavily on the contribution from SINTEF. This must not be confused as dependency, due to the many alternative outsourcing collaborates available both nationally and internationally. However, most of these alternative, domestic outsourcing partners are competitors, and not considered as real alternatives. On the other hand, this indicates that the technical expertise are available and possible to acquire outside a collaboration with SINTEF. Customer D also have in-house expertise to develop the solution to some extent, but prefer to use SINTEF as they are more experienced, and have a level of technical expertise which provides Customer D with competitive advantage. We therefore argue that there are some dependency from the customer side. From a SINTEF-perspective, it is not considered any dependency, as the collaboration is sporadic and counts for only a few hours a month.

"We could develop the solution in-house, but would not have the same technical precision. Our contact person in SINTEF knows the project and are internationally recognized as one of the best within [technical field of operation], which ensures that we have competitive advantage towards competitors" - CD.

5.3.3 An asymmetric dependence relation is unfavourable towards the small business.

Proposition eight is also found in *Chapter 2.3 - Dependency*, and might be seen as an extension of proposition six "Small companies perceive that they have a high degree of dependency towards SINTEF as they are partner structured," which states that the presupposed dependency asymmetry is unfavourable towards the small enterprise with no consideration to which degree of un-favourability.

Case A

As we concluded in Chapters 5.3.1, 53.2 and 5.2.2 – *Case comparison – The Seven Dimensions of Dependency model*, it is to some degree an asymmetric dependence relation between Customer A and SINTEF. This is confirmed by the Customer, who stated, *"we are highly dependent on SINTEF, but I don't think they are just as dependent on us. However, they want all the income they can, right?" - CA.* However, in this project, it seems like the dependency asymmetry is a result of a series of deliberate choices. Customer A has distributed power to SINTEF, due to their experience and expertise, and due to their lack of resources. Obviously, this creates an asymmetric dependency aspect. The question is to which degree this is unfavourable towards the small business.

In this project, it seems like the contrary- the customer experienced that this asymmetric power balance, and thus asymmetric dependency balance, was a necessity in order to perform the R&D-project. They appeared to be highly satisfied with the asymmetric dependency-relation, and stated, *"we could never have done this project without SINTEF being involved at this level"*. SINTEF on their hand stated, *"in this case, we had to take control. [Customer] had no experience and did not know how to lead this project" - CA.*

Case B

In *Chapter 5.3.1 and 5.3.2*, when looking at the seven dimensions of dependency-model, we concluded that there are an even amount of dependency distribution between both actors. This conclusion takes into account that the customer really does not need the product, but volunteered to join the consortium. However, when looking at case specific matters that do not comprise this parameter, and only look at expertise, we identified that there was a significant dependency between the different actors in the project (see Chapter 5.2.2 *Case B*).

The respondent from the customer side explicitly expressed that the project management and plan, and thus dependency, was unfavourable towards the small company. However, he also expressed that

"[..] we was asked to join this project after the project plan was written, and thus rely on the plan made by scientists. We would never have done it this way, but has to follow their lead now, due to the non-diluting grants" - CB.

We argue that this might be seen as an unfavourable dependency aspect, but the customer would not agree that it in general was unfavourable that they was dependent on SINTEF.

Case C

In Chapter 5.2.1 – *Use of grading in Cases*, we concluded that this is the project with most asymmetry when considering the dependency distribution between the small company and SINTEF. This was confirmed in *Chapter 5.2.2 – Case comparison – The seven Dimensions of Dependency model*, whereas we concluded that the collaboration provides the customer with unique competitive advantage. The customer does not feel that this dependency are unfavourable, as they are highly satisfied with the collaboration with SINTEF. The most important thing for Customer C was to control the IP after the project, which "[..] *are regulated in the contract process in advance of the project. For us, contracts are one of the most important tools in order to ensure that no one party takes advantage over the other*" - *CC*. Thus, we conclude that asymmetric dependency distribution is not a concern for the customer in this project.

Case D

As we concluded in *Chapter 5.2.2 – Case comparison – The seven Dimensions of dependency model*, Customer D is reliant on external competence in order to perform R&D. Our findings in *Chapter - 5.2.1 – Use of grading in cases* gave intel showing that the customer highly value the competitive advantage obtained through a collaboration with SINTEF, and that they have an urgency-aspect to consider. In total, we concluded that there to some extent is a dependency aspect from the customer side, while SINTEF has very little dependency towards the small company. However, we have no evidence that supports that SINTEF use the asymmetric power distribution in order to obtain their own goals or agendas, and thus the gathered information is inconclusive when it comes to conclude whether this distribution is unfavourable for either party. However, both SINTEF and the customer was satisfied with the current relationship and collaboration.

5.3.4 There is a direct link between success in the project and whether there are exercised positive or negative power by either A or B towards another

The last proposition in *Chapter 2.3 - Dependency* considers the success ratio in R&D-projects between small enterprises and research facilities; whereas theory presented in Chapter 1.2 – *Theoretical context*,

states that there is a direct link between the mentioned ratio and whether the dominant part in the collaboration exercise positive or negative power towards the counterpart.

Case A

The project in Case A is only halfway through the total R&D-process and this is the first project between SINTEF and Customer A. Hence, it is hard to determine whether the project can be considered a success. However, both the customer and SINTEF states that they consider the project to be a success at this point. In Case A, SINTEF deliberately exercises power towards Customer A, and stated, "*in theory, the customer has the power as they have the money, right? But in this specific case, I felt I have to take control and make decisions on behalf of the customer*" - *SA*. The customer on their side stated that they were satisfied that SINTEF took control, and "*they are experienced, and I could never have done this project without the help from SINTEF*" - *CA*. This indicates that it is plausible that there is a direct link between exercised power and success in an R&D-project. In this case, SINTEF exercises positive power domination towards the small company.

Case B

The customer entered this project with expectations of getting a finalized product after the R&D-phase, which also was their measurement of success. As they stated "*what makes the project a success is whether we are able to demonstrate a unit that is able to solve the problems defined in our goals*" - *CB*. SINTEF on their hand was only ready to deliver a proof of concept prototype, and had to lower the expectations from the customer. In addition, SINTEF is somewhat ambivalent when defining the project as a success, as they stated that

"it differs between who is defining the concept of success. From a product perspective, I consider the project as a success, but I don't think the customer has the financial resources to realize the innovation" - *SB*.

The customer defines power in the relationship as individual, and feels that participants in the project should talk to counterparts with equal positions in the hierarchy, but mostly that the power delegation was predefined in the contract phase. SINTEF agrees, and stated that the power delegation was predefined in the contract phase, which limits the possibilities to exercise power beyond what is defined in the contract. To summarize, there was an uneven expectation between the parties in advance of the project, which had to be sorted out in a contract phase. The contract also defined the power distribution in the project, which seems to be distributed evenly between both parties. We could not find any correlation between power distribution and success/failure in this project.

Case C

SINTEF feels that there is good chemistry between both parties in the project, where both the customer and SINTEF has the opportunity to exercise power. However, he feels that the customer is the one with

power in the end, sometimes too much power, and that if the customer says jump, he will jump. He expresses some concern about if this always is the best method, but as the customer expresses "*[...] the appears exemplary with regards to power delegation. [..] but are really careful to express that the customer is the one taking risks*" - *CC*. Both parties think it is too early to determine whether the project can be defined as a success, but the customer feels that it is success at the product side, as they have developed some technology that works. Hence, it is too early to conclude if we can see a pattern between power distribution and success/failure rate.

Case D

In this relationship, the customer defines the projects with SINTEF as absolute successes. They characterises the process as a dream, and are satisfied that SINTEF provides them with products they can take to market. SINTEF on their hand feels that they provide real value to the customer, and finds most projects in the relationship Customer D & SINTEF as successes. Experienced project managers lead this project from the customer side, and it is an obvious trend that the customer has most of the power in this relationship. However, they feel no need to exercise this power, as they have a long history with working together with the SINTEF employee. In addition, they emphasises the importance of having well defined contracts prior to a R&D-project. This case might indicate that there is a relationship between power delegation and success in R&D-projects.

5.3.5 R&D projects are dependent on managerial competence in order to perform a successful collaboration, with no preference whom possess this competence.

The tenth proposition is based on our theoretical findings presented in *Chapter 2.3.1 – Inter-organisational R&D-collaboration*, and suggest that R&D-projects rely on managerial experience in order to be successful. It does not discriminate between whether it is the small enterprise or SINTEF that possess the experience, but simply states that managerial experience is one of the most important competencies to perform successful R&D-projects. However, it is expected that SINTEF possesses this experience in most cases, and as we underpin in Chapter *1.1 Social and Historical context and 1.2 Theoretical Context*, most small companies lack recourses, including experience.

In general, as we concluded in *Chapter 5.2.2*, the project managers from the customer side in case A, B, and C does have no or little experience with managing R&D-projects. Only the project manager in case D had what we classified as High experience. On the contrary, all project managers from SINTEF had a lot of experience with managing R&D-projects with the industry. This makes the basis for our further analysis of the different cases.

Case A

In case A, SINTEF had overtaken all responsibility for project management and implementation. The SINTEF representative stated that due to the customer's inexperience, he felt obligated to take control in order to execute the project. The customer clearly expressed gratitude to SINTEF for taking this role,

as she felt lost in the bureaucracy that comes with project management. In this case, we concluded that it is most likely that the R&D-project was dependent on managerial competence in order to perform the project.

Case B

This is a consortium comprising several national and international actors, where the customer has the overarching responsibility to coordinate the project, and perform as the project manager. He is satisfied with his role, and feel that he is able to manage all the tasks necessary to execute the project in a successful manner, despite his lack of experience. He especially emphasises the professionality from the other partners. However, there have been some problems, but he was able to sort them out of the project. This might indicate that R&D-projects are not dependent on managerial experience in order to perform the project. One disclaimer might be that it is somewhat unknown for us to which extent other collaborates than SINTEF contribute in the project management.

Case C

Similar to the two previous cases, the project manager provided by the customer has no previous experience with managing R&D-projects. That is why he decided that SINTEF should manage the day-to-day operations, while he is the overarching administrative manager. This seems to be an agreement both parties are comfortable with, and both parties are satisfied with the collaboration. The customer stated that "*My experience with SINTEF is that they are an professional organization, whom has standardized routines and project management competence [..]*" - *CC*. This indicates that managerial expertise was preferred, and may be necessary in this case.

Case D

Case D was the only case where both the customer and SINTEF had extensive project managerial experience. In addition, they had done several small and medium R&D-projects in cooperation previously, and thus had a good relationship to one specific SINTEF representative. The relationship is considered highly informal, and the customer stated "[...] *me and (SINTEF representative D) has an incredible collaboration, that's my impression*" - *CD*. This is supported by the SINTEF representative, who stated that he "[..] *enjoys working with Customer D*" - *SD*. We concluded that this case is inconclusive, as the tight relationship, informal setting and the size of the projects; it seems to eliminate the need for project management.

6 Discussion

In this chapter, we review the propositions and compare them to theories we discovered in the literature study. This will give us basis to conclude our research questions in Chapter 7.1 – *Conclusion of thesis*. We present the theories Influence and Dependency separate, and integrate them in Chapter 6.3 – *Power imbalance discussion*. For each chapter we present the results of the propositions as a recap before we discuss each proposition separately.

6.1 Influence discussion

Table 38 Recap of propositions related to Influence

#	Proposition	Result
1	Small businesses collaborating with SINTEF will express high liking of SINTEF	True
2	SINTEF will perceive a high liking from their customer.	Unproven
3	SINTEF will express a high degree of liking their customer.	True
4	Small customers of SINTEF respect their authority as an expert, and often surrenders decision making to the researcher(s).	Partially proven
5	SINTEF representatives must often act outside their responsibility and administrate the process to ensure progress.	Partially proven

What the table shows us is that there is a high liking of each other between the research institution and its partners. Regarding the involvement of SINTEF in decision-making we see this as partially proven. The propositions 4 and 5 were proven for customers with low technical experience. For the more experienced companies the propositions were unproven, as they did not surrender decision making to SINTEF.

6.1.1 Liking - Proposition 1

In order to discover if small businesses was easily influenced by SINTEF, this proposition was developed to reveal if the companies were receptive for influence based on their relationship to SINTEF in view of liking.

Small businesses collaborating with SINTEF will express high liking of SINTEF

As described in 5.1.1, interviewees from the customer side expressed high liking of SINTEF. There seems to be a confirmation process involved, where SINTEF lives up to their reputation, or simply delivers what is expected/defined in the contract. SINTEF's ability to deliver, and in some cases deliver outside the scope of the research, is a positive experience for the companies depending on research for product development.

The research was focused on liking by association. What we see is that the reputation of SINTEF is not the reason for interviewees liking them, it's their ability to live up to the reputation. We can state that

Cialdini's liking by familiarity from Chapter 2.2.2 - *Liking principle (Association)* is the most fitting liking factor as the liking is based on "repeated contact under positive circumstances". However, the liking could also be a result of Influence principle Consistency as SINTEF's deliverance is a proof of good choice in collaboration partner. Cases A, C and D experience SINTEFs competence more valuable than alternative outsourcing opportunities, creating liking and a possible power imbalance as mentioned in Chapter 1.4 - *Theoretical context*.

The liking in general should make the customers more receptive of SINTEF's influence. There is also the matter of trust, which according to Plewa et al. (2013) was one of the key factors for a good university industry linkage.

Being able to determine a liking factor and influence principle shows that Cialdini's theory (2001) is applicable in an inter-organizational partnership, but we based our propositions on the association factor of liking and this was not confirmed. The fact that SINTEF were participating in decision-making, proves that they had the possibility of influencing their partner, and that this participation was based on the customers liking SINTEF and their performance. Cialdini's impression (2001) is that possibilities of influence is negative, and that there are ways to exploit the psychology. The customers are aware of their ownership of the project, as well as they are open on what kind of input they want and appreciate from the scientists involved from SINTEF. The only thing missing is the customer being unaware of the potential of being influenced, as it is expected that SINTEF provides advice on multiple levels based on their wide experience. Therefore it will be unclear if the potential influence is negative based on the problems made by Cialdini (2001). Especially when the problem with influence is based on the influencer is taking advantage of psychological factors for their own success. The scientists may use the opportunities for self-realization, but based on their statements it seems more like they are aiming to contribute.

6.1.2 Liking - Proposition 3

We continue with Proposition 3 as Proposition 2 was dropped in Chapter 5.1.2 - *SINTEF will have perceived a high liking from their customer.* When investigating liking towards SINTEF, we wanted to investigate if the feeling was mutual. Not only will the empirical data show us how established the collaboration was, but also lets us gain some initial results on how small research and development projects are received by the employees at SINTEF.

SINTEF will express a high degree of liking their customer.

Confirmation of the customers liking perceived by SINTEF was never defined, but SINTEF expressed high liking of their customers. The scientists themselves are aware of the fact that they might influence the small businesses, especially the inexperienced ones, but they try to aid them in becoming the best customers possible. In addition to being forced to do project related work outside of their responsibilities. The scientists make themselves depended upon from a customer point of view, but in

addition they have to work and get involved in the business development, which may be less suitable for SINTEF as customers expect more than the project description includes. From SINTEF's representatives point of view the involvement in a development process with a start-up or small business is inspiring, as they are involved in not only product development, but also market/user research and business development. Investigating whether this inspiration is related to entrepreneurship involvement, getting access to detailed business insight or smaller products is not defined.

The liking principle is complemented by reciprocation and consistency. The scientists get to be more involved than on larger projects, and commit themselves to the projects as they get more insight and a wider mandate than usual. The invitation to contribute may trigger a desire to pay back the favour with increased enthusiasm and involvement in the project. Regarding Cialdini (2001), it is anyway possible to detect signs of influence and categorize what form of influence, or what the given influence possibility is based on, in a product development collaboration between SINTEF and a small company as customer. As Dyer and Singh (1998) describes, relationships of strategic value are potentially important in order to develop competitive advantage. The results of an R&D-collaboration are expected to be of incredible value for the small company regarding the competitive advantage.

It's almost as if Cialdini's thoughts on decision making is of greater consequence to the research organisation than the small company; "*Once we have made up our minds about issues, stubborn consistency allows us a very appealing luxury; we don't have to make any other tough decisions*" Cialdini, 2001). Meaning that once a small inexperienced customer of SINTEF finds the comfort in including SINTEF in decision making, the research institution get a bigger responsibility and have to perform to a certain standard in business counselling as well as product development. In addition we can say that as liking goes both ways in these business collaborations, there is no downside to both parties being able to say yes; *"We most prefer to say yes to the requests of people we know and like"* (Cialdini, 2001).

6.1.3 Expert authority - Proposition 4

As mentioned in 1.2 – Theoretical Context, we research if there is an unconsciously delegation of power from the small enterprise. As we wrote in Chapter 2.2.3 – *Symbols of Authority*, these symbols may provide a shortcut for decision making, and we wanted to research if this was also happening on a professional level in a R&D-collaboration, thus we presented the following proposition.

Small customers of SINTEF respect their authority as an expert, and often surrenders decision making to the researcher(s).

There is no doubt that the companies in collaboration with SINTEF respect their knowledge and see their expertise as valuable. However, surrendering decision-making did not happen as a shortcut in any of the cases. In case A, SINTEF was given many influence opportunities on both technology and business development, and in Case C they were expected to take ownership of the project. None of the

project owners did this without stating that they still were the ones in charge of the project. In case B and D SINTEF was only allowed input on the technology, and had very strict guidelines. SINTEF are able to establish a lot of trust when they are allowed to influence business development also, making their expert authority cover several areas outside their field of expertise. This level of influence is not similar to surrendering decision making, but when discussing our research questions in Chapter 7.1 – *Conclusion of thesis*, the level of influence will be essential.

Being able to leave important decision making to the expert is the shortcut one would naturally be following according to Cialdini (2001). In this setting it is also fitting to emphasise that "We allow ourselves to be swayed more by experts who seem to be impartial than by those who have something to gain by convincing us" (Cialdini, 2001). However, the less experienced companies were the ones surrendering decision making, and the more experienced the companies were, the less they surrendered decision making SINTEF has little or nothing to gain by influencing their customers to make the wrong decisions. The scarcity of technical expertise or project management experience on the customer side might increase the worth of the input from the SINTEF representative. Thus, the inexperienced entrepreneur might rush into a decision based on only the meaning of the scientist, but the ownership has not been surrendered. The reason for SINTEF representatives are given various levels of influence may be based on the defence strategies against influence that Cialdini suggests: "Even knowledgeable authorities in a field will not persuade us until we are satisfied that their messages represent the facts faithfully" (p. 197, 2001). It is reason to believe that some are being more careful than others of which areas of expertise the scientists should be able to influence. It could also be a matter of self-confidence for the customer, knowing where they are the expert and where SINTEF is.

As previously stated, "information from a recognized authority can provide us a valuable shortcut for deciding how to act in a situation." (Cialdini). This is relevant to the way the project owners have involved scientists in the decision-making, but this is not a situation where one needs protection from the problem of being influenced. One must focus however, on the questions to ask when being influenced; "Does the authority represent a true expert?" (Cialdini, s. 196). Although not ideal, for someone inexperienced and new to product development the quality of advice given might be sufficient coming from a scientist somewhat insightful or familiar with business development, just to make the small company focus on the right activities. For someone more experienced it seems sufficient with SINTEF deciding on technical issues as long as product specifications are met, but the essential skillset would be knowing that demands based on contract terms are to be met and to maintain the focus on optimal use of suppliers expertise (Wynstra & Pierick, 2000).

6.1.4 Expert authority - Proposition 5

In Chapter 2.2.3 – *Symbols of authority* we also presented the proposition regarding SINTEF's possible role extension giving them the opportunity to influence decision making. This proposition would allow

us to show how much SINTEF representatives actually got involved, not only by contributing in research and influencing decision making, but acting for the company matters not related to R&D;

SINTEF representatives must often act outside their responsibility and administrate the process to ensure progress.

In Case A there is a clear involvement on many levels from SINTEF's side. Presenting technological solutions, taking responsibility for funding applications and influencing business decision was a part of the project. In the other cases progress is gained without the enthusiasm and input from SINTEF's side on other aspects than the technology. There is a clear difference between the inexperienced companies and the other companies here, showing that SINTEF may be forced to act outside their responsibility to ensure progress. This is only valid for companies new to this type of organizational collaboration and who are not used to stating claims.

Regarding the scientists feeling convinced to act outside their responsibilities, some act this out more than others do. As Cialdini points out: "people feeling responsible for a contract will be more likely to live up to that contract" (2001). In these collaborations the SINTEF representatives know they must be the responsible ones, trying to live up to the contracts, but in addition they must live up to the expectations from the customer and involve themselves in problems outside the contract, such as searching/applying for funds and sharing knowledge about business development. However, the more experienced the customer company is, the less they expect other than R&D activity from SINTEF, but always expect a market ready product. The ability to extract benefits from a company relationship when critical resources are available is however an important asset according to Håkanson and Snehota (1995) and Dyer & Singh (1998).

6.2 Dependency discussion

In this chapter, we will look at our propositions from our literature review regarding dependency, and compare them to our findings in our case study. In general, our findings revealed that there is asymmetric dependency distribution between each party, as discussed in Chapters 1.1 - *Social and Historical Context* and 1.2 - *Theoretical Context*. This creates a foundation for further discussion about what our findings actually mean, compared to findings in previous literature we investigated.

We begin with presenting our proposals related to dependency:

Table 39 Recap of Propositions related to Dependency

#	Proposition	Result
6	Small companies perceive that they have a high degree of dependency towards SINTEF as they are partner structured	Partially proven
7	Small enterprises are highly dependent on the contribution from research institutions due to their level of expertise	Partially proven
8	An asymmetric dependence relation is unfavourable towards the small business.	Partially false
9	There is a direct link between success in the project and whether there are exercised positive or negative power by either A or B towards another	Partially proven
10	R&D projects are dependent on managerial competence in order to perform a successful collaboration, with no preference of whom possess this competence.	Inconclusive

Table 39 illustrates our overarching comparison sheet between theoretical propositions and how they fit with our case study findings. What is interesting about this comparison is that none of the propositions are neither confirmed nor disconfirmed. Every proposition is both confirmed and disconfirmed by single cases in our database, which leads to the question if the cases were too diversified or we had too few respondent. There might be several reasons causing this outcome, which might be subject to further research, as it is more suitable to explain in an explanatory research design. However, what we can see is some distinct trends within several of the cases, which will be topic for further discussion.

6.2.1 Power dependence relations - Proposition 6

In Chapter 2.3 - *Dependency*, we discussed theories stating that to which degree one party depends on another, is determined by the nature of the relationship between the parties. These theories created the foundation of our first proposition within *Dependency*, stating that:

Small companies perceive that they have a high degree of dependency towards SINTEF as they are partner structured.

The main idea is that one behaves differently towards agents/principals in a direct transaction based relationship, versus how you behave towards partners in a collaboration and/or consortium in R&D-projects. What we found, as presented in Chapter 5.2.2 – *Case comparison – The Seven Dimensions of Dependency model*, was indications that there is some truth in this proposition. For instance, we concluded in Chapter 5.2.1 – *Use of grading in cases* that both cases A and C felt a high degree of dependency towards SINTEF in a partner structured collaboration, which thus confirmed our findings in the theory. However, in case B the dependency distribution was more evenly distributed, and concluded that there was no evidence to support our findings in our literature review. Lastly, we failed to identify the nature of the relationship in case D during the R&D-project. At the moment, they are structured as agent- principal relationship, which makes this proposal false.

In Table 37 in Chapter 6.2 - *Dependency* we stated that the proposition was partially proven, as half of the respondents stated that the proposition was true, while the second half disproved the proposition. Emerson (1962) might explain this, as cited in Chapter 2.1.1 - *Power Relations*, as he claims that 'power is a property of the social relation, it is not an attribute of the actor'. If power is seen as dependency, this claim might be interpreted with an understanding that the customer distributes power to SINTEF, conscious or not. Chapters 1.1 - *Social and Historical Context* and 1.2 - *Theoretical Context*, which underpins the necessity of resources in order to perform a R&D-project, support this. As we see in the Seven Dimension of Dependency model, case A and C lacks of some important resources, while case B and D are more established, medium sized companies. This might be one of the explanations to why the findings are fragmented, and will be discussed more thoroughly in Chapter 6.2.2 – *Dependency – Proposition 7*.

To summarize, we found some indicators that there is a relationship between resources and to which degree the customer feels dependent towards SINTEF. In addition, SINTEF has a strong brand, which seems to be appreciated by the customer, strongly linked to liking-theories.

6.2.2 Dependency - Proposition 7

Our seventh proposition is based on the literature review Chapter 2.3.1 - *Inter-organisational R&D collaborations*, and concentrate around the resource imbalance between small enterprises and SINTEF. In this proposition, we have focused on expertise, mostly technical expertise in order to develop the initiated solution in the respective projects. To recap, the proposition was:

Small enterprises are highly dependent on the contribution from research institutions due to their level of expertise

The main thought is that SINTEF possess world-leading expertise within several fields of their operation, and that small companies have few or no alternative outsourcing partners that can solve the problem they are addressing. This lack of potential partners would create increased dependency from the small company, supported by Hillman, Withers, and Collins (2009), Crook & Combs (2007) and Jonesa et al., (2014) in *Chapter 1.2 Theoretical Context*. They stated that 'The research institutions' knowledge and expertise are resources that the entrepreneurs cannot retrieve from other actors. This makes them critical resources for the success of the small business and causes a dependency**,** establishing the research institution as the partner with the bargaining power. This contributes to create a power imbalance or an asymmetric power distribution'.

Our findings in the empirical study revealed that this is only partially true, as we received fragmented feedback from our respondents. As mentioned in both Chapters 5.2 - *Dependency* and 6.2 - *Dependency*, we discussed why we classify this proposition as partially proven. This does however not mean that we claim that the proposition is true, but that it might be subject to further research. Our findings revealed that it is only in case B the customer is highly dependent on the specific expertise possessed by SINTEF,

and to some degree in case D. However, all of the companies perceive that they receive outstanding expertise that could not be acquired elsewhere within reasonable limits. Especially case A stands out, as SINTEF originally did not possess the technical expertise within the field of research, but had to acquire this expertise during the project. In addition, this expertise is considered relatively easy to acquire from competitive R&D-facilities, but the customer felt such great value by collaborating with SINTEF and their expertise within other fields, that SINTEF was preferred. This might be due to liking by association, as presented in Chapter 2.2.2 – *Liking principle (Association).* SINTEF has a strong brand in Scandinavia, and are seen as a quality provider within most fields of research. Their status automatically transfer to the projects they are involved in, and gives credibility to the technology developed.

Our findings strongly indicates that the small companies are highly dependent on external technological capacities to get or maintain competitive advantages and develop new products as described in their project plan. However, in most of the projects, it is not necessary with the state of the art expertise provided by SINTEF, as other actors might engaged. However, the small companies feel that they get added value through association with SINTEF, and their expertise within other aspects of R&D-projects as well.

6.2.3 Dependency - Proposition 8

Based on Chapter 1.2 - *Theoretical Context* and 2.3 - *Dependency*, we concluded that theory states that an asymmetric dependency distribution among participants in collaborations are unfavourable towards the less resourceful part. Hence, we proposed that this could be transferred to R&D-collaborations between small enterprises and SINTEF, and created proposition eight:

An asymmetric dependence relation is unfavourable towards the small business.

It is important to emphasise that the theory we are referring in our literature review, especially in 2.1 *Power – A brief introduction* to mostly cover the fields of agent-principal theories, inter-organisational collaborations and other fields that not are directly comparable to R&D-projects between small companies and R&D-facilities. The closest theories we have investigated are university - industry linkage. In a small company - R&D-facility relationship there are some distinct differences from the relationships that are mentioned above. For instance, the variety of possessed resource base between the parties seems to be of a particular importance, cf. Chapters - 1.1 *Social and Historical context*, 1.2 - *Theoretical Contex*t and 2.3.1 Inter-organisational R&D-collaboration.

What we found in our case study was that this proposition was partly false. First, we did find strong indicators stating that there was an asymmetric dependency distribution between the parties. However, we could not find any reliable proof that supported the fact that this asymmetric distribution was unfavourable to the customer. The customer in case B was the only respondent who felt that the asymmetric distribution was unfavourable towards the small company, but also stated that this position

was due to extraordinary circumstances, and due to their late entry into the project. What is interesting is that both cases A and C recognized that there was an asymmetric distribution of dependency between the parties within their respective research projects, but did not feel that this was unfavourable to either them or the project. On the contrary, they stated that they could never have performed the project without the resources provided by SINTEF, and that they felt SINTEF used their position to help the customer. The SINTEF representative in case A, C and D., also expressed this as a personal goal. Two of our previously mentioned theories might explain this:

1: SINTEF using their dependency position to help the less resourceful part might be comparable to the theories of power from Chapter 1.2 – *Theoretical context*, and how to exercise positive power domination (Ritter, Wilkinson and Johnston, 2004).

2: In Chapter 2.4 – *Practical implementation of decency theory,* we look at the collaboration, and thus the relationship, where our findings are similar to most theories: the relationship is usually between two or few people with one predefined contact person from both parties. This is reminiscent to inter-organisational collaboration, creating a sense of ownership from both parties.

To conclude, we found asymmetric power distribution in most cases, often regulated by contracts. However, SINTEF seems to exercise positive power dominance, helping the small company achieve their goals. The small enterprises seems to not only tolerate this behaviour, but also appreciate it.

6.2.4 Dependency - Proposition 9

The last proposition in Chapter 2.3.1 - *Inter-organisational R&D-collaboration* is based on the perceived success rate in R&D-projects. This proposition might be seen in combination with our discussion in section 6.2.3, as we also discuss positive and/or negative power positions in that proposition. The proposition is as follows:

There is a direct link between success in the project and whether there are exercised positive or negative power by either A or B towards another.

The reason why we came up with this proposition is to see if there is a correlation between (1) success and exercised power, and (2) perceived power distribution and collaborative frames. As mentioned in our literature study, Chapter 2.3 - *Dependency,* delegating power is a necessity (de Wit & Meyer, 2010; Lai, 2014), and might be beneficial to the project if the power dominant actor exercises positive power in order to optimize the project (Ritter, Wilkinson and Johnston, 2004).

Overall, our empirical findings suggested that the proposition was partially proven, but in this proposition as in most of the other propositions, we did not get enough proving or disproving data to conclude whether the proposition is true or false. What we saw was that in case A was a great example of SINTEF exercising positive power, helping the customer to perform the R&D-project. In project C, the customer was the project manager, holding the overarching responsibility of project completion. The project manager felt that they were included too late in the project, and was bound by the progress

plan set by the R&D-facilities. This resulted in a special situation, where the customer felt that he was not included in the planning period, and thus could not influence the project. He felt that several of the milestones should be different, and the exercised power had a negative influence. Meanwhile, in project B and D, the customer exercised power towards SINTEF, which, based on our understanding from the empirical study, was considered naturally in both projects. The representatives from the customer side had taken control, and exercised power in order to manage the projects. Both the customer and SINTEF expressed that this was a good solution.

Chapter 1.2 - *Theoretical Context*, states that experience provides power, and thus reduces dependency, might explain this. Emerson (1962) underpins this, as power is an attribute possessed by the actor who has leverage towards another party. As we see from the SDD-model, the customers in case B and D has experience in managing new product development processes, which leads to a situation where they feel comfortable with the role as the dominating party in the consortium.

To summarize, our findings indicates a trend where exercised power increases project efficiency, as most of the respondent acknowledge the need for someone to be in charge, and that the responsible party exercise positive power. However, we failed to identify whether there is a linkage between negative power and unsuccessful projects, as this only was present to some degree in case C, and that case C actually was considered a success.

6.2.5 Inter-organisational R&D-collaboration - Proposition 10

Our very last proposition views the R&D-collaboration as a tight relationship with few actors and frequent interactions, similar to inter-organisational projects where people are working across internal divisions in large companies. The basic thought is that people from different backgrounds and divisions or companies rely on routine and experience from the project manager in order to optimize the project efficiency. Therefore, we came up with the following proposition:

R&D projects are dependent on managerial competence in order to perform a successful collaboration, with no preference of whom possess this competence.

The proposition evolved out of two different theories. Firstly, the proposition views the resource perspective described in Chapters - 1.1 *Social and Historical Context* and 1.2 - *Theoretical context*, stating that small companies often lack experience and competence to manage R&D-processes. As SINTEF possesses this experience, it seems naturally that they will take the lead as project managers. Secondly, we looked at the inter-organisational theories presented in Chapters are 2.3.1 - 2.3.2, which, as mentioned, states that such projects are dependent on managerial experience. This proposition is included in the dependency Chapter 2.3.1 *Inter-organisational R&D-collaboration*, as we conclude that whom possesses the managerial expertise influences the dependency dynamics in the relationship.

What we found in our SDD-model in Chapter 5.1.6 - *Case comparison - Dependency through the Seven Dimensions of Dependency model* was that in case A and C, the customer had no or little experience

with managing new product development projects. The customer in Case B had some experience with managing projects in general, but not R&D-projects in collaboration with SINTEF. Lastly, customer D had several years of experience managing R&D-projects in cooperation with SINTEF. What we concluded in our evaluation in Chapter 5.2.5 - *R&D projects are dependent on managerial competence in order to perform a successful collaboration, with no preference whom possess this competence* was that both case A and C was dependent on managerial expertise from SINTEF to perform R&D-projects, as they saw great benefits from extracting the experience from SINTEF. In case B, the customer stated that they did not rely on the competence from SINTEF, but did agree that managerial experience is necessary in R&D-projects. Finally, we concluded that the customer in case D was inconclusive. However, every representative from SINTEF stated that managerial expertise and/or experience is necessary in order to conduct a successful project.

Our findings suggest that the project to some degree are dependent on managerial expertise, and we failed to find if there is a difference between whom in the consortium who possess these resources, as long as the power distribution is well defined and subject to the planning phase in advance from the project. Our experience and feedback from our empirical study suggest that 'the partnership and the frames of collaboration should be discussed in-depth before two parties join forces'. This is supported by our findings in *Chapter 1.2 Theoretical Context*, where we stated that "*small enterprises with little experience cannot say how an optimal research project would be organized, and thus must rely heavily on the research institutions advice or choices for the project, causing a dependency not only for technical knowledge, but also project management."*

To conclude, there seems to be some context between managerial experience and project success. However, this must be seen in the context where all of our interview cases were considered successes, and that SINTEF had managerial expertise in all projects, even though they did not always lead the project. In the end, our findings supports our theoretical findings, and we have no data providing us with evidence otherwise.

6.3 Power imbalance discussion

In order to answer Research Question 1 – "Can we identify an asymmetric power balance between research institutions and small enterprises", we presented four of the propositions as related and integrating for influence and dependency in Chapter 2.5 – *Summary of propositions.* Based on the discussions presented until now, we will review the results and reach a more overarching conclusion regarding the existence of power imbalance.

Table 40 Propositions related to Research Question 1

#	Proposition	Result
4	Small customers of SINTEF respect their authority as an expert, and often surrenders decision making to the researcher(s).	Partially proven
5	SINTEF representatives must often act outside their responsibility and administrate the process to ensure progress.	Partially proven
6	Small companies perceive that they have a high degree of dependency towards SINTEF as they are partner structured	Partially proven
9	There is a direct link between success in the project and whether there are exercised positive or negative power by either A or B towards another	Partially proven

In discussion of **proposition 4** we found that the lower the experience of the company the higher degree of letting SINTEF representatives influence decisions taken by the company. The possible power imbalance here lies in the ability of decision making. There is no sign of forced decisions, and all project owners are aware of their position as decisions so influence from SINTEF is based in a trust in the researcher. To some extent the most inexperienced ones involve the SINTEF representatives in the administration of the project to a degree of surrendering decision making. This border crossing between being influenced by and involving someone clearly suggest power imbalance being present.

Regarding **proposition 5** SINTEF representatives were more involved in the administration of the R&D-project when working with inexperienced and to some degree high demanding customers. They feel to some degree convinced to act outside their responsibilities in order to ensure the R&D-progress is as planned. The power imbalance here is unclear. Although scientists with experience may be convincing, the project owners must still allow the contribution. It is a matter of how much access the scientists are granted outside their research responsibilities. Similar to proposition 4 the power asymmetry is based on how much access to the project administration the scientist are granted, leaving the power to the customer, who may have high regards of the researcher, and/or the research institution.

Proposition 6's discussion results stated that customers highly depending on SINTEF's resources are also more dependent on SINTEF, and may distribute power as a part of the relationship. This can be related to proposition 4 and lack of experience, where experience may be seen as a resource the small company is dependent on. We here confirm that the Scarcity principle in Table 2 - *Principles of Influence (Cialdini, 2001),* corresponds well with dependency and that dependency is also an element of influence. What type of resource the small company is dependent of or lacking, decides to which degree they are dependent towards SINTEF. This is, of course, also case and project specific.

In **proposition 9** we concluded that "findings indicates a trend where exercised power increases project efficiency, as most of the respondent acknowledge the need for someone to be in charge, and that the responsible party exercise positive power." Utilizing a power position may aid the project, which was something we found in proposition 5 to be the aim of the scientists. This was well received by the small companies, who may have been uncomfortable in the dominant role, regarding project management. It

also became clear to us that SINTEF had few outspoken hidden agendas, and thus would only gain from exercising positive power, as this leads to higher short term and long term revenue stream and strengthened brand.

Influence and dependency both have a significant impact on power and how power is perceived and exercised. As defined in several chapters in this thesis, what is important to emphasise is the fact that we are not considering power, dependency or influence as negative concepts themselves, but an outcome of the social relations between individuals in different collaborative settings (e.g. Chapter 2.1.1 – *Power relations*, 2.1 – *Power theory – a brief introduction*, 2.3 – *Dependency).* It is important to understand that these concepts are not three completely different subjects, but rather highly related to each other. This means that not only might one concept help us understand the others, but they overlap and affects each other, where several authors struggle to distinguish them apart. For instance, in Chapter 2.2.3 – *Symbols of authority*, we chose to not include "scarcity" in influence, as this is covered by dependency, even though Cialdini (2001) includes that concept within the field of Influence. On the other side, being independent creates a leverage position a company might use to influence to counterpart to achieve personal goals or objectives. Several of our discussion points in Chapter 6.1 – *Influence* are similar or identical to the points in Chapter 6.2 - *Dependency*, making our conclusion part synoptic and verified. Therefore, what we have written in Chapter 7.1 - *Conclusion of thesis* must be seen as a result of our joint understanding of both influence and dependency, and the impact they have together on our overarching problem statement.

7 CONCLUSION, IMPLICATIONS, AND FURTHER RESEARCH

As we have finished our analysis of findings and discussion, our research discoveries are ready to be concretised and presented. We have discovered recommendations regarding behaviour for small companies and large research organisations collaborating in R&D, presented in Chapter 7.3 – Recommendations for an R&D-collaboration. This coincides with the aim of educating small companies in optimising their R&D-outsourcing, presented in Chapter 1.1 Societal and historical context. We also present recommendations regarding further research, as the subject is not fully researched in our view.

7.1 Conclusion of thesis

In this chapter we answer the main research question and title of our thesis; "Are there asymmetric power relations in a product development project involving small enterprises and large R&D-institutions?" By answering all three research questions developed in Chapter 1.5 – *Purpose*, we can conclude the answer of the title question, and in addition describe the implications for the actors involved in the case study, and actors within the same scope. Our discoveries are an important contribution to the society due to the importance of entrepreneurship and its impact on the macroeconomic society. Our impression was that small inexperienced companies involved in R&D-collaboration might delegate power to the experienced research organisation. This is crucial knowledge to the companies as they must be sure of their responsibilities regarding project management, as well as it is of importance to the research organisations, who may easily step outside their responsibilities and end up with surplus labour responsibilities.

7.1.1 RQ1 Can we identify an asymmetric power balance between research institutions and small enterprises?

Our first research question is designed to answer a self-experienced challenge that occurred in one of our own R&D-projects including a start up and SINTEF. Our literature review revealed that there is usually an asymmetric power balance between actors in collaborative projects including small- and large companies, as presented in Chapters 1.2 Theoretical Context, 2.2.3 Symbols of authority and *2.3 Dependency*. This situation usually arises due to imbalance between each parts asymmetric resource base, e.g. financial resources, experience, competence and brand. For instance, brand might have a huge impact on the power balance, as this creates liking and symbols of authority, which creates a perceived dependency aspect. As we concluded in *Chapter 6 - Discussion*, we were able to identify power asymmetry between small companies and large research institutions in our empirical study. However, this did not lead to power exploitation, domination, or unfavourable working conditions for the small

company. On the contrary, SINTEF exercised positive power in order to help the small company perform in the project, and thus we confirmed existing theories.

Power distribution among partners in network has been researched thoroughly, and the findings did not come as a surprise to us. However, there was some question marks we were uncertain how would act in such a constellation as the relationship between small companies and SINTEF in R&D-projects. E.g. we did not know which objectives or hidden agendas semi commercial R&D-facilities have, or how they felt working with small companies. The question that naturally arises is WHY they acted the way they did, and if this is a normal procedure with no regards to whom they are collaborating with. Traditional theory states, as described in Chapter 2.1.2 - *Relationship* that this is a normal way of acting against your customers and suppliers, in order to achieve a common goal. It is therefore natural to think that SINTEF's goal is to earn money as a service provider and thus gain from projects lasting the full project period aiming for a positive experience and outcome for the customer as well. In addition, it is reasonable to think that they view the small customer as a potential, future customer, and want recurring customers. These questions are not subject to this thesis, but might be an appropriate subject to a new thesis.

7.1.2 RQ2 How is the power distribution between the research institution and customer company in relation to influence?

To answer this research question, we factored it into two sub-questions, RQ2A and RQ2B answered bellow:

RQ2A:
What is the typical level of liking among the partners in an R&D-collaboration?

As we described in Chapters 5.1.6 – *Summary and general discoveries* and 6.1 - *Influence*, liking is high both ways in most of the projects. The parties involved have no problems expressing how important their partners were and that they like working with them. Liking was one of the main principles of influence, and would suggest that influence is somewhat evenly distributed among the partners because of this. By Cialdini (2001) we can suggest this is a matter of Similarity and Familiarity - both liking factors one can establish over time in a relationship. Similarity was initially evaluated as irrelevant, but regarding the fact that the relationships are more interpersonal than inter-organizational, one can develop a feeling of likeness as one has common interests and are sharing something unique together.

RQ2B:
Can we observe the authority role of the expert influence the small business?

There were clear indications that SINTEF had been given power to influence the small business by virtue of their role as an expert, but the small company also had power to influence the acts of their research partner as they were unquestionably the project owner. Thus, we would argue that yes the

authority role of the expert influences the small business, but both actors are aware of the situation and have come to terms with it, especially as it is within interest of the principal. Concerning the literature of Cialdini, we see that SINTEF has some influence on not only the process, but also technical solutions, and in some cases, even business strategy. Allowing influence on such a level may not have been the initial plan of the customers, but they do know that they are the ones with the power, fitting with Batonda and Perry's (2003) stating clear regulations of power must be defined for the R&D-collaboration. We believe that the level of influence could be controlled or planned better. Utilizing all resources available for progress is a part of the entrepreneurial mind-set, and as SINTEF has obligations to the customer, they try their best to satisfy the customer's needs. It is important to remember that the area of expertise is related to the R&D project technical claims or expectations. Other dimensions where SINTEF can contribute with input is based on their personal experience, and desire to participate in the project on a personal level from the scientist's point of view. There were clear indications that SINTEF had been given power to influence the small business by virtue of their role as an expert, but the small company also had power to influence the acts of their research partner as they were unquestionably the project owner. Thus we would argue that yes the authority role of the expert influence the small business, but both actors are aware of the situation and have come to terms with is, especially as it is within interest of the principal, aiming for optimal use of suppliers expertise (Wynstra & Pierick, 2000). With regards to the literature of Cialdini we see that SINTEF has some influence on not only the process, but also technical solutions, and in some cases, even business strategy.

RQ2
How is the power distribution between the research institution and customer company in relation to influence?

As stated in Chapter 1.4 – *Layout of this thesis* we wish to describe the situation as realistic as possible. The power distribution between the research institution and its customer companies seem fairly and evenly distributed as it is joint agreement that the customers are the project owners and can terminate the project, but that SINTEF are important input presenters when making decisions, both on the developer level and businesses level if the customers let them. It is not the matter of customer company's size which Andries & Thorwarth (2014) and Teirlinck & Spithoven (2013) relate to outsourcing, but it is the level of experience which decides the level of influence for a research institution. The authority role of the expert in other words vary. With RQ2A we have defined that there is high liking in the cases, and both actors are often open for a democratic approach. This works well with the fact that the case studies are all Norwegian, and this type of even power distribution is typical for Norwegian culture, exemplified by the Hofstede Multifocus Model on Organisational Culture and Change (Hofstede, 1986). The additional contribution of SINTEF is appreciated by the small enterprises, but they still trust input based on experience rather than field of expertise. Cialdini (2001) is very clear on the fact that one should be able to see the signs of influence and even develop counter measures in order to avoid making poor decisions, or being affected by the strategic influential

approach. However, the type of influence referred to by Cialdini often regards someone being unknowingly convinced to change their habits or behave in a certain manner, whereas in the influence of the R&D-relationships we studied can be seen more as an expected and wanted part of the service from the customer side. In other words, one intentionally gives someone the opportunity to influence oneself to improve the process one is involved in. One does not pay only for product development based on a specific product description - instead; SINTEF is expected to offer suggestions for solutions and understand some of the user / end user needs.

7.1.3 RQ3 To which degree is the small enterprise dependent on the research institution, and how can the small enterprise obtain a level of dependency that optimizes the value of the collaboration?

This research question is mostly based around dependency, and the context was set from our literature review and personal experiences. What we see is that it is an asymmetric dependency aspect to consider, but as SINTEF in general seems to exercise positive power, we failed to identify any improvements in the relationship, and thus cannot say how the small company should leverage the asymmetric relation in order to optimize the collaboration. All our respondents stated that they were generally satisfied with the terms and conditions that come with a collaboration with SINTEF. In addition, several of the respondents underpinned the necessity of a thorough planning process to create cooperative frames and terms of collaboration in advance of the project. Lastly, it seems like the answer to this research question is within the personal collaboration level, as to which degree the relationship is considered positive seems to be a property of the individuals collaborating, rather than the companies. This is also supported by our literature review *Chapter 2.1.1 – Power relations*, as power is a property of the social relation, not of the individual himself. Therefore, cooperative frames, communication and interpersonal skills seem to be of great importance in order to succeed in R&D-projects. Existing theory as presented in *Chapter 2.3 - Dependency* supports our findings, stating that "[..] most theories underpin the necessity of delegating responsibility to optimize project effectiveness (de Wit & Meyer, 2010; Lai, 2014) and that companies use their resources to "[..] help a firm achieve its objectives [..] (Ritter, Wilkinson and Johnston, 2004). In other words – existing collaboration and power theories might be transferred and practiced in R&D-projects involving small companies and large research institutions.

7.2 Theoretical implications

This thesis and its content are based around power and related theories. The field of power has been thoroughly researched, at both individual and corporate levels, and researchers approaches power from different angles and perspectives. In addition, there is no "standard" definition stating what power actually is, which eventually created some theoretical implications. This led to a narrowing of the scope,

where we decided to approach power from an influence- and dependency aspect and managed to develop framework for evaluation of influence and dependency level in R&D-collaborations.

When investigating Influence we based our assumptions on theory from the work of Cialdini (2001). The theory describes the psychology working when it comes to influence on a personal level, where the aim is to affect other people's choices, and subconsciously as well. We could not identify the aim of affecting among the actors in our cases, only collaboration and a demand for input from the expert varying according to experience level of the customer. Thus we could not describe influence as a negative aspect of an R&D-collaboration, but rather the opposite; a source of inspiration enhancing the partnership. Based on Cialdini's Influence theory (2001) we did contribute with suitable framework for discovering different principles of influence in a business relationship on the human individual level with few people involved. We have discovered that trust is an important principle for good collaboration, described by Plewa et al. (2013) in Chapter 2.1 - *Power theory - a brief introduction.* However, Cialdini (2001) does not mention trust as an important and a positive principle for influence and power.

When approaching dependency, we used power theories developed by Emerson (1962), and supplemented with both old, highly cited theories, and new research within collaboration, relationship and power. The common ground for all theories was their dependency-perspective within different theories involving collaboration. In addition, we included inter-organizational theories in order to investigate whether these theories might be transferred into new product development projects (R&D-projects). Having such a mix between explorative and descriptive design in our literature review, combined with an investigating approach created some implications in both our literature search and implementation. For instance, this is a wide approach, and we believe that by using this approach, we are able to fill the gap that we failed to find in our literature review – an empirical study describing the dependency aspect between a semi-commercial R&D-facility and small companies. We do not provide any new theories or new findings, but were able to confirm that existing theories are suitable to transfer to small enterprises – R&D-facilities relations.

In addition, we believe that our Seven Dimensions of Dependency model might be a valuable tool to evaluate potential R&D-partnerships. Even though this tool is developed for the purpose of this thesis and as an analytical tool for our empirical data between our respondents and SINTEF, we believe that this tool, and its approaches, with modifications, is applicable for most small companies that cooperate with large research institutions as an evaluation tool.

7.3 Practical implications

Our main reason for performing this research was to identify potential pitfalls when small enterprises are collaborating with large research institutions, and develop practical guidelines to small companies

in the same situation as the cases we studied, as mentioned in Chapter 1.5 - *Purpose*. In addition, we also wished to emphasise on activities one should focus on to strengthen the collaboration. Through our case interviews, we have identified some recommendations that are relevant to R&D-collaborations fitting the scope of our research. The list of recommendations is based on the direct suggestions from our interview subjects, combined with an impression of how the process was described.

7.3.1 Recommendations for customers

- SINTEF is a large organization, covering many research fields. Establishing contact with the technological expert suitable for your project may take time and demands endurance as not everyone at SINTEF can understand exactly what you need based on just a phone call.
- Researchers at SINTEF have different attitudes regarding what type of project they might be suitable to contribute in. Many of them are used to working with projects that have set frames and clear claims, and prefer this way of organizing a project. Some researchers however get inspired when they can think outside the box, and be of aid in the process of business development, combined with technology development.
- In any process, clear goals are important for the best possible result, and a research collaboration with SINTEF is no exception. Although some researchers may be inspired by an unstructured approach - defining the goals and claims of a project is important. Not only to have an agreement of what the result should be, but also to be sure that SINTEF understands your needs and your intentions when developing new technology.
- SINTEF is not a service provider, nor are they technological consultants. They are a research organisation whose definition of success in a R&D-project may be different from your definition. It is therefore important to agree on the process and what should be the result of it.
- Learning as much as possible from the process will strengthen your project management capabilities and increase the potential of a good dialogue with SINTEF during the process.
- Make sure you introduce SINTEF to the field/environment in which the research is to be put into use, and that they share with you their capabilities and limitations. In some research projects, SINTEF needs to develop their own knowledge to deliver on a customer's needs.
- R&D-projects demand a lot of you as a customer. Make sure you have the resources, both financially, organizationally and technically to take advantage of the potential contribution from SINTEF.
- A relationship with SINTEF does not only involve access to their competence, but also their network, which they will involve if they see the potential in you and your project.

7.3.2 Recommendations for SINTEF:

For SINTEF responses from both their own representatives and customers inspired these recommendations in how to receive entrepreneurs / small businesses.

- All small businesses with ambitious goals have the potential to grow, and could therefore be one of your future large customers.
- SINTEF as an organization is large and complex for an outsider. If their idea or approach is not suitable to you or your department, there might be another employee who is able to deliver the needs of the potential customer.
- Compared to large customers, small enterprises and entrepreneurs are result driven with little or no interest in reports or publications. The aim of the R&D-project should be execution, prototyping and field-testing to ensure a fast delivery of applied research.
- Working with small customers gives you direct contact with the decision makers and administration of the company. This will enable unique insight in market segments, business development strategies and end user needs.
- Small customers and entrepreneurs bring forth the potential of applied research, meaning that prior studies may be implemented in products suited for end users with newly developed needs or demands.
- Working with small businesses demands more agility, fast decision making and use of experience outside your field of expertise, compared to large organisations. This is the reality of working with entrepreneurs who have the potential to be developing a new revolutionary product.

7.4 Further research

It is an established truth that entrepreneurship counts for a huge amount of value creation in western countries, and has the potential to even increase its value by improving two overarching challenges:

Improving collaborations in general, and improving industry – academia collaboration. As more and more small companies are able to perform R&D-projects outside large companies R&D-departments, the subject of R&D-collaboration and power asymmetry are important to investigate further.

Firstly, we want to present suggestions for further research of this topic with different approaches to which aspect of the collaboration between small enterprises and large research institutions. In this thesis, we viewed the impact of a potential power asymmetry, but there is several aspects within the field of collaborative theories that might be investigated in such collaborations. For example, the planning and phase in advance of the project, and the impact of contracts should be considered an important field of investigation. Further, one should consider the resource asymmetry more in-depth.

Secondly, new research within the field of asymmetric power in R&D-collaborations might consider different aspects of Power itself. The definition of power is debated, and might be approached from a various set of angles. We chose to consider the influence and dependency aspect of power in order to perform this research. There are three possible new angles to approach asymmetric power relations in these kinds of relationship as we see it. Firstly, new research might include other definitions of power, which requires other terms to explain asymmetric power relations. Secondly, both influence and dependency are wide terms that might be investigated separately. Lastly, there might be other literature within the terms of influence or dependency conflicting with our definition, which might give new angles to our conclusion. In addition, on a theoretical level it would be interesting to uncover other principles of Influence, certainly on a more inspirational level than subconscious level as mentioned in Chapter 7.2 – *Theoretical Implications.* The uncovering of everyone liking each other is certainly an interesting find, and one should investigate if there are collaborations where this may not be the situation. In addition, it would be interesting to uncover more differences in projects where the ones involved are not so dedicated and self-sacrificing.

Further, it is important to take into consideration the empirical design of such an investigation. In our empirical study, we performed a case study with a descriptive research design. We argue that this thesis has reached its goal – to describe the relationship and power structure in research projects where small companies collaborate with large research institutions. For instance, what we found was that the relationship are dependent on planning and contracts. However, we found asymmetric power balance, where SINTEF in some cases took control over the project. To take the investigation to the next step, we recommend that further research is concentrated around an explanatory design, to investigate why this situation occurs, and how.

Lastly, we do recommend further research to consider our findings in our empirical study, and use these as foundation for a new investigation. For instance, our customer-respondents were all considered a mix between small companies and start up companies. Further research might narrow the scope into start-ups to see if it is possible to distinguish between start-ups and small companies, as this thesis has shown that there is some differences in the resource base between small companies and start-ups. In addition, another research might include an investigation in the differences between small companies – research institutions relationships and large companies – research institutions relationships. Lastly, there are cultural differences between countries, which might have impact on relationships and collaboration. Thus, new research might include a comparison of Norwegian R&D-collaborations and international R&D-collaborations.

For SINTEF it would be interesting to uncover how many of their employees are interested in working on small scale projects and with entrepreneurs, educating them in developing market knowledge and experience with business development. Not only did it inspire the researchers, but it gave the customers

a more full-service experience which could benefit the reputation of SINTEF and make them more capable of applied science on all levels.

One important question is if the customer got their **value** back from the project. Another is to what degree the customer accepted and/or initiated the goals being altered as a result of the process. If the alteration was accepted - who was then in charge of the process? If the customer initiated the change, how did they get influenced to change the direction.

8 REFLECTIONS

In this thesis, we are researching collaboration theories on optimizing research and development projects involving small companies and large research institutions. Our literature review describe how power delegation among participants is affected by influence and dependency. This was confirmed in our empirical study, which in most cases underpinned the necessity of contracts, planning and a common understanding of how to carry out the projects. For instance, we saw that it was important to clarify the expectations and goals of the projects, and delegate responsibility to perform optimal during the period. However, the irony is that our research project evolved through several stages, even though we left out the necessary clarifications ourselves. This miscommunication and poor project planning, combined with much activity on individual/other projects led to uncoherent research process, which eventually led to one party being highly dissatisfied with the collaboration, productivity and work distribution, as the other author was too relaxed about the progress in the thesis. This led to a realization where we faced the obvious – we did not follow our own suggestions, and thus had an untidy, slow and far from optimal process.

Inspired by our supervisor, we have decided to put extra effort in our reflections by retrieving both new relevant theory and theory we have presented in this thesis, to study our process and our experience. Being students at NTNU School of Entrepreneurship, highly engaged in separate start-ups, other projects and organisations, we are contributing to enlighten students following in our footsteps so that they may avoid a similar process. Combining start-up, thesis research and other activity should be manageable, and we evaluate our "worst-case" project to exemplify the pitfalls.

This chapter in particular describes the process with the focus on work structure and execution of research. Due to both of us working in our own start-up projects, collaboration on a Master Thesis has been troublesome and of course this has led to multiple limitations of the research. Not only have we postponed work related to the research and postponed submission date multiple times, but also underestimated the workload and time needed to perform in depth research necessary for this thesis.

8.1 Collaboration development and group dynamics theory

To review our collaboration in an academic perspective we base our theoretical research on the book "Arbeid i Team" (Work in Team) by Lavin and Rolfsen (2015), and many of the quotations are from that book in particular, as it has many guest authors". It is commonly used as a basis for team development among students at the Institute Industrial Economics and Technology Management at NTNU, but neither Gjølme nor Staksrud Hansen have taken courses introducing this as curriculum. We first present a general review, and then focus on elements relevant for our own reflections.

Members of a group can learn by teaching to others and by learning from each other, and the common interest is to create a foundation for academic specialization (Levin & Rolfsen, 2015). Effective learning builds on experience, observation, abstract concept formation and active experimentation (Kolb, 1976). Conformity defines a group, whilst teams are characterized by dynamic interaction (Belbin, 2000). To work in team successfully one must have common norms to achieve goals and performance, and there are strict actions, purposes and commitments (Katzenbach and Smith, 1993), and one must develop a psychological contract based on mutuality with regards to balance and trust in order to create a positive environment (Osland et al., 2000). Johnsen & Johnsen (1997) defines *teams* as participants with personal needs met by working to achieve a common goal, with a feeling of affiliation and having a common faith and thus a mutual dependency. One has defined roles, rules and norms that facilitates interaction, communication and collaboration.

To work in teams is demanding, and should only be preferred when conveniently and the members have a common purpose and understanding of requirements of performance, and certain criteria's for membership (Levin & Rolfsen, 2015). A team develops through several phases (e.g. Gersick,1989; Rosen, 1987; Tuckman & Jensen,1977), and we'll use the framework proposed by Tuckman & Jensen (1977) to explore our own process, as it is suitable for describing the dynamics in a student assignment by Levin & Rolfsen (2015). Tuckman & Jensen propose four phases in team development; (1) forming, (2) storming, (3) norming and (4) performing, and they are described as follows:

Table 41 Tuckman & Jensen's four phases of team development

# & Title	Description
1 Forming	The members are getting to know each other. The members are excessively polite, and experience uncertainity for how to behave. Everyone is giving an effort not to insult each other. One holds back questions on who has power, and it is common that the members have doubts to their own and other participants skillset, and usually some of the members have prejudice against others. The mandate and goals are being determined in this phase.
2 Storming	Characterized by emotional involvement, where each member tries to mark their territory. Stances are being taken, and personal interests and values are determined and shared. This phase are characterized by conflicts about who is doing what, vague goals and subgrouping which enlighten disagreements in the group. However, conflicts do usually lead to a stronger sence of togetherness after such a process.
3 Norming	The feeling of belonging is greater, and members tend to smooth out disagreements and problem. Members want to appear more unified than other teams. The team has in this phase developed a set of rules for cooperation and social behaviour.
4 Performing	Teammembers trust each other, and disagreements are based upon case specific matters, and not an urge to distinguish them selves. Problems are solved by looking at the greater goal, and thus does not create friction.

Development through the four phases does not happen automatically, and not every team reaches the last phase. One can move backwards in the phases if there has been periods of time without interaction, and the development of teams requires deliberately and focused work (Levin & Rolfsen, 2015). One can experience a conflict, but Levin and Rolfsen (2004) state that conflicts can be both constructive and

destructive, but can especially be positive in the long run. Bales (1966) states that teams experience different cycles, where the cycles are repeated and the team have to balance between the need to solve the problem they are targeting, and the need to develop relations between the members.

Norms are developed in the early stages of the cooperation, and represents unwritten rules that shapes the relations and work environment. Even though team members are familiar with each other from previous relations, they are now facing a new and unfamiliar task to be done, and mutual trust has to be built among the members. Newly developed teams lack structure, routines and a clear distribution of roles. That is why it is effective to leave an open process that defines some common rules for the cooperation, and to have frequent discussion about norms in the day-to-day operations.

A team contract is an important tool to mobilise the necessary resources within the group in order to create a foundation for the future cooperation. Levin & Rolfsen (2015) presented a model called GRPI, inspired by previous research performed by Kolb et al. (1986). This model is to be seen as a tool to help you create a suitable team; (G) Goals, (R) Roles, (P) Procedures and (I) Interpersonal relations. These are four important characteristics to consider in a team, where goals are the most important of those four, as this is the phase where you concretize the results you want to achieve in order to perform as a unified group. Zander (1994) stated that the three most important characteristics for a well-defined goal are realism, measurability and moderate difficulty. Failing to identifying and discussing personal expectations in the team may lead to three pitfalls (Levin & Rolfsen, 2015):

- Team members feel unsatisfied with the team
- Lack of common goal for the team, realistically based on all members' individual goals
- Lack of common definition of the problem or the task at hand, resulting in everyone working with different solutions based on different understandings of the problem

The question of role distribution is usually based upon who takes responsibility for which tasks, and should be determined explicitly at the very beginning of the cooperation (Levin & Rolfsen, 2015). Defining who should do what, in order to help the team reach their goals is essential as conflicts may occur if one has other expectations to one self and their effort than the expectation the others in the team has. According to Meredith Belbin (2010) there are nine roles in a team; implementer, resource investigator, plant, monitor, shaper, coordinator, complete finisher, team worker, specialist. The roles are mostly defined by personality, but behaviour is also affected by other team members.

Table 42 The nine team roles identified by Meredith Belbin

Role title	Role description
1 Implementor	Disciplined, effective and trustworthy, making ideas implementable, but lacking flexibility and willingness to try alternatives.
2 Resource investigator	Enthusiastic, good at communication and finding new options. Is a good networker and optimistic, but loses interest as soon as it is challenging or some form of resistance.
3 Co-ordinator	Mature and relaxed with overview of others needs and the ability to set direction, but can sometimes take too much room.
4 Teamworker	Focused on collaboration and diplomacy. Good at compromising, but lacking driving force and is easily influenced by others.
5 Plant	Creative, with many ideas and new solutions, but focused on his/her own ideas so much that communication with others can be hard.
6 Monitor / Evaluator	Has the overview and is continously evaluating the activity of the group. Lacks progression and the ability to inspire.
7 Specialist	Works very individually and independently, but with a one track mind. Has great knowledge, but may be too focused on details and then missing the whole picture.
8 Shaper	Is challenging, dynamic and puts pressure on the other team members. Is able to remove obsatcles to ensure completion of the tasks, bur may provoke and hurt others because of lacking empathy.
9 Completer / finisher	Focused on correcting errors and mistakes and securing a correct finish, but may worry too much and be too focused on details.

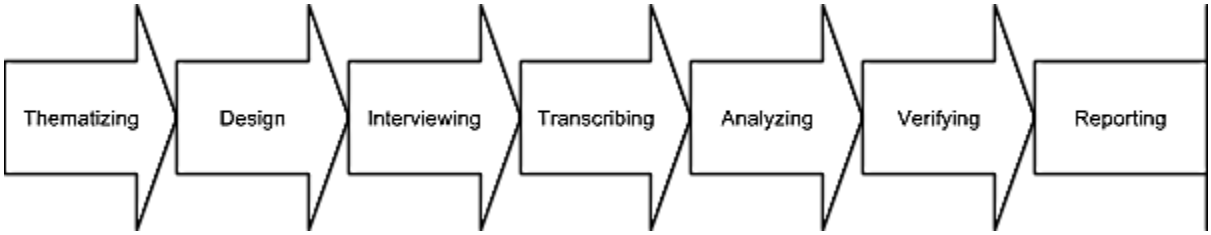
Procedures are all about clarifying how one should do the practical day to day collaboration, e.g. how are decisions made, how do we distribute work tasks, how should we communicate etc. Every team member does not necessarily need to agree to all of the procedures, but there should be routines for how to handle conflicts and disagreements.

Interpersonal questions in the team rely on the goals, roles and procedures having been established, as this is a question about the relations between the members as they involve feelings and personality together with the rationality of the tasks to be performed.

The importance of leadership in teams is based on making it possible for team members contributing with different abilities and skillset, in combination with involving them in all important parts of the process. There are two core processes in a team, one is collaboration to solve defined tasks, and the other is the development of social community and identity. Both processes demand leadership, and if one does not view leadership as an individual activity, it will appear as a function, which need to be maintained. There are certain amounts of management tasks that must be maintained for a team to work together, but these tasks does not need to be solved by one person. The more important the aspect of time is, the more important is the need to have a clear delegation of the different management tasks. To refrain from relating to the management tasks may have serious consequences, as some of the most destructive for a group is being unclear regarding decision making and defining the leadership function (Levin & Rolfsen, 2015)

8.2 Individual perceptions of group development

In order to uncover how we performed regarding collaboration and team development we will individually evaluate the process based on the four phases: forming, storming, norming and performing with human dynamics and emotions as empirical underline. We use the seven steps of study from Chapter 3 - *Methodology* to have a common basis and will compare our perceptions and explain what kind of situation we could have avoided using a group contract. We use colour coding to clarify how the phases distribute. Under is an example of how we will present it visually:



Forming	Storming	Norming	Forming	Performing

Figure 12 Example of phase interpetration of progress, xisualizing phases can be revisited

8.2.1 Gjølmes perceptions

In preparations for this Master Thesis, we went through two academic productions together; a project assignment and a term paper. We had found a common research subject and a working rhythm that suited both and made us meet deadlines although both were busy on separate fields. Both in terms of managing our own separate start-ups and other projects we were involved in. The following figure shows my perception of what phase we were in during the writing of this thesis:

Table 43 Gjølme's perception of phases

1 Performing	2 Norming I	3 Storming I	4 Forming	5 Storming II	6 Norming II

1 Performing

Much of the thematising was already set and performed before we started the work, and a lot of inspiration had defined some of the content e.g. the interview guide showing we were well on the way in design. We then had the trust built in the performing part of the project assignment to continue working. This would be the beginning of the year 2015 and our first objectives was completing the interview guide and creating a plan for the whole semester. I feel my role was like the implementer as the main focus was to complete the tasks at hand (developing interview guide, project plan and recruiting interview subjects).

2 Norming

The plan we developed was impossible to follow as we got engaged in other projects forcing us to work very ad hoc, which was fine as our previous academic collaborations had mainly this structure. A lot of defining, both regarding methodology and theory had to be revised and expanded to give basis to the interview questions we wanted to ask, and give depth to the analysis we were to perform. This demanded more effort than the literature review like we had performed before. It was at this stage we separated on the academic directions, wanting to cover both dependency and influence in one thesis. This resulted in splitting the research into two subjects between us. New theory was needed to give substance to the newly nuanced Influence aspect and the same with our methodology. This makes me interpret the design phase and parts of the interview phase as norming due to the fact that there was a great sense of unity between us and a lot of effort was put into showing we could do this work without problem. I especially thought this was solvable as Influence became "my" direction. It also feels like a norming phase as I did not know anything about methodology or any of the aspects of academic research on this level and felt I needed to come up to speed with my partner who had expressed more experience in academic writing. I feel my role was a combination of Plant and Specialist. The theoretical research gave many new ideas I thought was valuable to follow, but I also focused a lot on the theory I needed to study resulting in very little communication, and lack of progress overview.

3 Storming I

Well into the interviewing and transcribing phase there was a bit of a storming phase as we could not make it to all the interview appointments together, and busy schedules made transcribing take longer than expected. There was no direct confrontations, so no conflicts to make us stronger, only marking of territory and taking stances. Due to busy schedules I had no idea what Staksrud Hansen was working on, just that I needed to finish "my part". When we met briefly on random occasions I tried to update him when he asked about my progress, but I only said something in the line of "I've found some theory we can use and I've written some summaries about it in our shared folder." Hansen mostly responded in the same way regarding articles he was reading so my assumptions lead to him being on sort of the same progression as me. This especially happened during the summer as we were to do a lot of the analysis to be prepared to meet our supervisor again in the autumn. My role was a mix of the implementer and specialist as I continued my business. However, my line of thought often got into the way of an evaluator – constantly evaluating if there really was any progress in the team regarding work I was not performing, causing me to define this phase as a storming. We had not defined any way to communicate our problems and it built up as I also felt I had to "chip in" a lot on tasks not assigned to me.

4 Forming

The storming phase was relatively short, but resulted in lack of trust and a prejudice on who was really giving an effort. I still did not communicate this as I was just hoping it would pass when stress on delivery dates closed in forcing both of us to just "get things done". However, my hopes were not helping and I continued being a specialist, just focusing on producing text to be reviewed by our supervisor. The whole process of analysis was taking up a lot of focus and effort so there was a feeling of progression.

5 Storming II

During the autumn most of our work was all over the thesis, but especially on the analysing and verifying part. Much the same ad hoc situation as the spring and winter, but now it wasn't me who was busy with other projects. I was slowly making progress, but after all the effort on all other aspects of the assignment it was hard working alone and in the blind, which eventually causing a lot of frustration and a outburst of emotions in writing to describe an opinion of unequal distribution regarding effort and production of material for the thesis. This confrontation would lead to something positive as our supervisor showed us how reflections on our collaboration also could be seen as a part of our research. I took the role of the Shaper in hope of forcing this project to completion as we had gone weeks without both of us producing any material, and there were some broken appointments and agreements, in other words a clear conflict on who was doing what.

6 Norming II

This part of the process was the finalising part where we both realised we had been too unstructured and without any goal for completion. We did not however develop any rules, but we met more regularly and communicated more through comments, chats, meeting and telephone calls while working. I still had the role of the Shaper, but also included parts of the Completer role, being focused on details when realising this was the final stage.

8.2.2 Staksrud Hansens perceptions

Table 44 Staksrud Hansen's perception of phases

1 F	2 Storming	3 Norming I	4 Norming II

1 F (Forming)

Before the collaboration was up for discussion, both parties knew each other fairly well being classmates at NTNU for a year and a half. During this period we had collaborated on several tasks, both academic thesis's and work related issues, sparring off each other. Mostly, these settings was involving several other participants as well, but at a more overarching level, with easy tasks to be solved. The

most comprehensive project we did perform together was the project thesis, and as we had done projects together before, and I felt little or no need to perform a full forming-phase in advance of the master thesis. These collaborations had been, in my opinion, successful, and I saw no reason for thinking the master thesis was supposed to be otherwise. I also were of a perception that Gjølme felt the same way, and that is why I consider our forming phase to be short and effective.

However, as mentioned in Chapter 8.1 – *Collaboration development and group dynamics theory*, new and unfamiliar tasks might create different situations as opposed to your previous relations, a potential threat we did not consider.

2 Storming

The project continued early in the winter 2015, with planning and enthusiasm, as both parties were highly interested in performing great at this stage. Both parties expressed a desire to obtain the top grade at the thesis, and a willingness to work hard for that to happen. However, this were never really a topic we sat down and discussed in detail, but more like an elevator talk escalated from our enthusiasm. To my understanding, we found ourselves in the Storming phase, which lasted through the Design-stage of the thesis:

3 Norming I

At this point, we had a review of our thesis due to feedback from our supervisor, and to some degree had to go backward to thematising stage of the thesis. However, I never felt that we took a step back to either forming or norming, but kept going without a project plan or role delegation. This led to unclear responsibilities, and no project management.

As both had multiple positions in different volunteer organizations, work positions, and our personal companies as well as the thesis, this enthusiasm soon faded away into a no communication relationship. At my point of view, this was due to a feeling of lost ownership to the thesis, no plan or project management, and a feeling that we had enough time to notice the thesis later that year.

Both situations mentioned above resulted in poor execution to our non-existing project plan, and two collaborative partners not communicating. We just pushed through without a plan, and at this point we were doing work on the thesis sporadically and at separate parts.

To some degree, I felt that we were in a norming-phase. We had developed a set of our own rituals for how to proceed, which I thought both found satisfying. Even though we to a large degree lacked momentum, no one of us expressed a desire to change the routines, as we did not see how the project could be executed otherwise, due to our other involvements.

4 Norming II

At some point in the transcribing part, Gjølme took the role as the project manager in order to get momentum back in the project. I consider this not to be classified as a performing phase, but rather I can see two different norming-phases with a distinct difference in the project management part of how the project was managed. For instance, I felt that I lost all control over the thesis and were not included. However, I was fine with that, as both Gjølme and I had a common goal of getting the project done – which indicates that we were on our way into a performance-phase. However, my feeling is that we never really got there. Again, this leads back to our lack of performance in the forming and storming phase after our revising of the project. We simply did not communicate our goals, and how to get there good enough. In addition, I were a lot absent due to different situations with my start up company, which worsened a poor communication collaboration.

8.2.3 Interpretation of differences

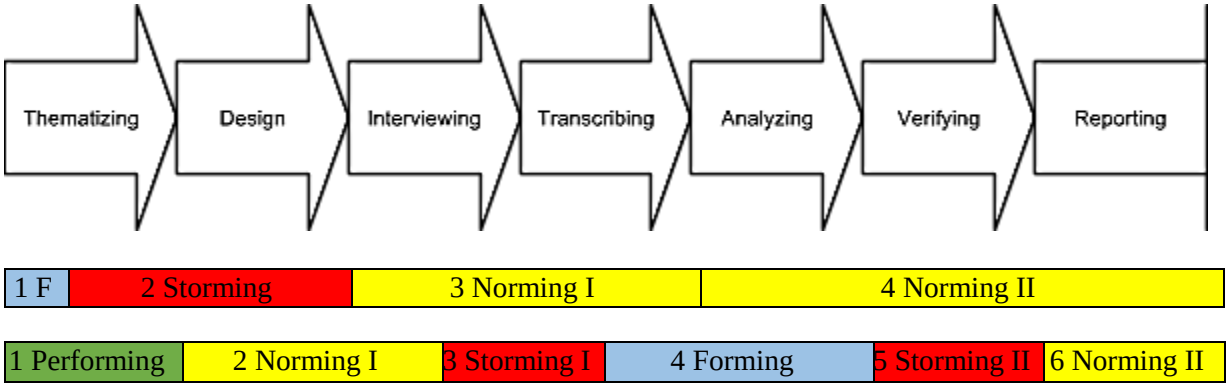


Figure 13 Comparison between Gjølme and Hansen's perception through seven steps of study

Clearly, we have quite different perceptions of how the collaboration evolved. We can almost say we were on separate planets. What we agree on, is that we saw no alternative way of working, other than just follow the path we were on already. If we compare the different phase perceptions, we see that we never define our collaboration in the same phase type. This proves that we did not discuss the process or refine it along the way. As the process is started with one participant in the forming phase and one in the performing phase it is easy to understand that the latter person felt greater progression than the one in a more insecure forming phase. A detailed clarification on expectations and goals might have brought both to a common state as the performing person felt certain of what needed to be done, but the one caught in a forming and storming state would not have the same clear perception.

Although we have had the perception of norming, both separate and simultaneously, none of the phases lead to defining common rules for cooperation and social behaviour. Clearly, we were used to working together and feeling enough progression not noticing norms needed to change, or we were ironically unaware of that the collaboration had a potential of improvement. Based on the written feedback it is also clear that the re-thematising encouragement from our supervisor worked better for Gjølme, who

had to explore additional theory and investigate methodology, than it worked for Staksrud Hansen trying to refine/narrow the existing theoretical findings from the project thesis.

An interesting situation is that the un-confrontational storming and forming insecurity of Gjølme during transcribing lead Staksrud Hansen to experience a behavioural shift perceiving Gjølme as the project manager. Feeling left out, Staksrud Hansen was fine with letting Gjølme continue on his path, leading to a confrontational storming from Gjølmes perspective, not noticed as a storming by his partner. Clarified communication procedures could have made Gjølmes inquiries more clear and comprehensible, in addition to making Staksrud Hansen responsive to the communication. Defining responsibilities would also have avoided the assumption that one was managing and the other had no tasks to solve. From theory, we can easily say we managed to experience all pitfalls presented by Levin and Rolfsen (2015):

- Team members feel unsatisfied with the team
- Lack of common goal for the team, realistically based on all members' individual goals
- Lack of common definition of the problem or the task at hand, resulting in everyone working with different solutions based on different understandings of the problem

The delegation of Influence and Dependency as individual directions or sub-fields of research combined with one focusing on Methodology lead to individual understandings of the task at hand. Clearly, we had no common goal as we had not even clarified our individual goals. All this lead to miscommunication and one expressing his unsatisfied expectations of the team.

8.3 Conclusion and implications

Following steps to avoid pitfalls clearly make sense now, but as we were two busy students involved in other established and working collaborations, we did not see this collaboration collapse as a possible outcome, as we already had finished theses together. In this chapter, we present our conclusion of our analysis above, in addition to pinpointing some crucial elements that affected the relationship. Our reflections gives us the opportunity to review and suggest advices for collaborations on a personal level for students researching and writing a master thesis, thus giving this thesis an extra layer of practical implications.

Before we started the process of writing this thesis, we had some experience collaborating both together and separately, which led us to believe that us working together was a good match. However, choosing the right partner is essential, as partnerships requires a give-and-take relationship between two or more parties, which creates dependency towards each other. In addition, the partnership and the frames of collaboration should be discussed in-depth before two parties join forces (Levin & Rolfsen, 2015). This is commonly known, and confirmed by all of the cases we interviewed in our study. As we both had

several independent projects besides our cooperation, it seems like we underestimated the value provided by establishing clear frames for the collaboration. As we can see in Chapter 8.2.3 - *Interpretation of differences*, we both had entirely different perception to which phase we were at in the beginning of the project. This leads to our first fault in the project management:

We did not discuss objectives, goals and process in-depth in advance of the project. This led to a lopsided start at the project.

As we can see from *Figure 13 - Comparison of Gjølme and Staksrud Hansen's perceptions*, this lopsided start and lack of Forming led us to perceive that we were part of entirely different stages of team relations during the whole project. In retrospect, we see that not delegating leadership tasks and responsibilities was a critical mistake, as mentioned in 8.1 - Collaboration development and group dynamics theory. This led to the project going through several stage – go iterations, without us having regularly discussions about responsibilities, phase of the relationship or goals even though we knew frequently interactions are required in order to optimize the outcome of the project/collaboration (de Wit & Meyer, 2010). Time went by, and suddenly we discovered that we had grew apart from our initial agreements. When we realized that we did not find ourselves at the same level, we also made another important discovery – during the project, we had developed two completely different goals, concerning both the quality of the thesis, and when we should deliver the product. This leads to our second fault in our collaboration:

We did not communicate either goals, the relationship, or responsibilities as the project developed, and took other shapes.

Lastly, but just as important – we did not communicate our feelings during the project. Due to our continuous increased gap in goals and perceptions, combined with time dedicated to work with the thesis, there was just a matter of time before one party or another would find themselves in a situation being dissatisfied with the product we produced and our project progress. As it turns out, this was something one party had been thinking about for some time without telling the other. This led to even more misunderstandings, and one person worrying so much he got exhausted and lost faith in the team's ability to finish. Our lack of focusing on a holistic and integrated thesis when assigning work responsibilities, combined with no common goals or milestones, and working separately rather than simultaneously resulted in catching up with each other demanding a lot of effort from both of us. We underestimated the importance of leadership, collaboration and responsibilities for progression related to a new assignment, thus ending in a state of collaboration conformity after completing the preliminary theses. This is quite transferable to Cialdini's (2001) principle of consistency as we stand by our choice to collaborate, but without working on developing a productive partnership.

To help others avoid the same experience we present practical implications for others collaborating on a Master Thesis. These are inspired by both Levin & Rolfsen (2015) and (Plewa et al. 2013) regarding

establishing and concretising research collaboration as key factors for a good UIL are defined as (1) communication, (2) understanding of needs and goals of partner, (3) trust in partner, (4) personnel facilitating collaboration and research, which applies very well to our collaboration as well.

Create a well-defined contract including e.g.:

Expectations and goals for individuals and team in total, time and effort everyone invests, norms for formal and informal communication, schedule for meeting and working regularly, discussion and decision making rules, feedback-routines, reactions when tasks are not completed, responsibility for planning, progression and effectuation, in addition to facilitating a stable and comfortable working environment.

Start early with presenting drafts for your supervisor, work continuously, avoid too many side projects, consider writing the thesis individually after collaboration on literature review and collection of empirical data if you don't find real value being in a collaboration. Discuss and build commitment by discussing possible trust-issues, before they occur.

In addition, communicate and interact frequent around the topics in this contract, and re-evaluate each of the suggested sections in the contract as the project evolve.

The collaborative relationship is based on dynamic communications, where the everyone involved should obtain a high level of confidence and trust in the competencies possessed by others in the collaboration. As we discovered through one SINTEF representative: the one of the involved parties, with almost no exceptions, chooses to listen to the power dominant party's suggestions. This might represent a leap between both parties perception of the collaborative nature, and underpins the necessity of having dynamic communication.

REFERENCES

Albors-Garrigós, J., Rincon-Diaz, C. A. and Igartua-Lopez J. I. (2013) "Research technology organisations as leaders of R&D collaboration with SMEs: role, barriers and facilitators" Technology Analysis & Strategic Management, 2014 Vol. 26, No. 1,p. 37–53

Anderson, J.C., Håkansson, H., and Johanson, J. (1994) "Dyadic business relationships within a business network context." *The Journal of Marketing* 1-15.

Anderson, J.C., Narus, J.A. (2003) "Selectively pursuing more of your customer's business", *MIT Sloan Management Review*, Spring, pp. 40-49.

Andries, P and Thorwarth, S (2014) "Should Firms Outsource their Basic Research? The Impact of Firm Size on In-House versus Outsourced R&D Productivity", Creativity and Innovation Management, Vol. 23, Issue 3, p 303–317

Ankrah, S.N., Burgess, T.F., Grimshaw, P., Shaw, N.E. (2013) "Asking both university and industry actors about their engagement in knowledge transfer: What single-group studies of motives omit" Technovation 33 p. 50–65

Bales, R. (1966) "The equilibrium problems in small groups". In: Hare, A., Borgatta, E. and Bales, R. Small Groups: Studies in social interactions pp. 444-476. New York. Knopf

Barnes, T. Pashby, I. & Gibbons, A. (2002) "Effective University – Industry Interaction: A Multi-case Evaluation of Collaborative R&D Projects" ,European Management Journal Vol. 20, No. 3, pp. 272–285

Batonda, G. and Perry, C. (2003) "Approaches to relationship development processes in inter-firm networks", European Journal of Marketing, Vol. 37, No. 10, p. 1457-1484.

Belbin, M. (2000), "Beyond Teams". Oxford. Butterworth Heineman

Belbin, M. (2010) "Team roles at work". New York: Routledge

Benfari R. C., Wilkinson, H. E. and Orth, C. D. (1986) "The effective use of power", *Business Horizons*, 29 (3): 12-16

Bergen, M., Dutta, S., & Walker, O., C., Jr, (1992). "Agency Relationships in Marketing: A Review of the Implications and Applications of Agency and Related Theories". Journal of Marketing, Vol. 56, No. 1.

Berglann, H., Moen, E., Røed, K., Skogstrøm J. F. (2009) "Entrepreneurship: Origins and Returns", IZA Discussion Paper No. 4250

Chesbrough, Henry W. (2003) "The Era of Open Innovation", MIT Sloan Management review vol. 44 nr. 3

Cialdini, R. B. (2001) "Influence - Science and Practice" Allyn & Bacon

Crook, T. R., Combs, J. G. (2007) "Sources and consequences of bargaining power in supply chains" Journal of Operations Management nr. 25 p. 546–555

Dalen, M. (2004). «Intervju som forskningsmetode : en kvalitativ tilnærming». Oslo: Universitetsforlaget.

De Wit, B., & Meyer, R. (2010) "Strategy, Process, Content, Context an international perspective" 4e. Andover: Cengage Learning EMEA.

Dyer, J. and Singh, H. (1998) "The relational view: Cooperative strategy and sources of interorganizational competitive advantage", Academy of Management Review, 23, 4, pp. 660-679.

Eisenhardt, K. M. (1989), “Building Theories from Case Study Research”, The Academy of Management Review, Vol. 14, No. 4, pp. 532-550

Emerson, R. M. (1962) “Power-Dependence Relations”. American Sociological Review. Vol 27, No.1. pp. 31-41.

European Commission (2005) “The new SME definition, User guide and model declaration” Enterprise and Industry Publications

Fontana, R., Geunab, A., Matt, M. (2006) “Factors affecting university–industry R&D projects: The importance of searching, screening and signalling” Research Policy vol. 35 pp. 309–323

Frazier, G. L., (1983). “On the Measurement of Interfirm Power in Channels of Distribution. Journal of Marketing” Research, Vol 20, (2), 158-166.

Gersick, C. J. G. (1989) “Marking Time: Predictable Transitions in Task Groups”. Academy of Management Journal 32 (2) pp. 274-309

Gilley, K.M. & Rasheed, A. (2000) “Making More by Doing Less: An Analysis of Outsourcing and its Effects on Firm Performance”, Journal of Management 2000, Vol. 26, No. 4, 763–790

Graebner, M.E., Martin, J.A. and Roundy, P.T. (2012) “Qualitative data: Cooking without a recipe”, Strategic Organization, vol. 10, no. 3, pp. 276-284.

Hakansson, H. & Snehota, I. (1995), “Developing Relationships in Business Networks”. Routledge. London.

Hamel, G., Doz, Y. L., Prahalad, C. K. (1989). ”Collaborate with your competitors and win”. Harvard business review, 67(1), 133-139.

Hillman, A. J., Withers, M. C., and Brian J. C. (2009) “Resource Dependence Theory: A Review”, Journal of Management nr 35(6) p. 1404–1427, Southern Management Association

Hoffmann, W. H. and Schlosser, R. (2001) “Success Factors of Strategic Alliances in Small and Medium-sized Enterprises—An Empirical Survey” Long Range Planning vol. 34 pp. 357-381

Hofstede, G. (1986). “Cultural differences in teaching and learning”. International Journal of intercultural Relations, Vol 10, Issue 3, pp 301-320.

Johnsen, D. and Johnsen, F. (1997) “Joining together: Group Theory and group skills”. (6th ed) Boston, Allyn & Bacon

Jonesa, S. L., Fawcett, S. E., Wallin ,C. , Fawcett, A. M., and Brewerd, B. L. (2014) “Can small firms gain relational advantage? Exploring strategic choice and trustworthiness signals in supply chain relationships” International Journal of Production Research,Vol. 52, No. 18, p. 5451–5466

Katzenbach, J. and Smith, D. (1993) “The wisdom of Teams”. Mc Graw Hill

Kim, W., C., & Mauborgne (2005). “Blue Ocean Strategy: How to Create Uncontested Market Space and Make the Competition Irrelevant”. *Harvard Business School Press.*

Kjernli, E. (2015). «-Dårlig nytt for norsk oljeindustri». Hentet 28.08.2015. http://www.nrk.no/norge/_-darlig-nytt-for-norsk-oljeindustri-1.12451477

Kolb, D.A. (1976). “Learning style inventory”. Boston: McBer.

Kolb, D., Rubin, I., McIntyre, J. (1986) «Organisasjonspsykologi», Oslo, Universitetsforlaget

Kvale, S. & Brinkmann, S. (2009). “Interviews - Learning the Craft of Qualitative Research Interviewing”. SAGE Publications, Inc

Lai, L., (2014). “Makt og påvirkningskraft: Hvordan få gjennomslag på jobben”. *Cappelen* Damm.

Langved, Å. (2015). «Tror oljekrisen fortsetter». Hentet 07.09.2015. http://www.dn.no/nyheter/energi/2015/07/15/2148/Oljeservice/tror-oljekrisen-fortsetter

Levin, M. & Rolfsen, M. (2015). «Arbeid i team». Bergen: Fagbokforlaget.

Luis, M. and Sachwald, F. (2003) "Co-operative R&D: why and with whom? An integrated framework of analysis". Research Policy nr 32 pp.1481–1499

Meld. St. nr 7 (2008-2009). (2008) "Et nyskapende og bærekraftig Norge", Oslo: Det kongelige nærings- og handelsdepartement, Akademika AS Avdeling for offentlige publikasjoner

Mouzas, S. and Blois, K. (2013) "Contract research today, where do we stand?" Industrial Marketing Management 42. 1057–1062

Olsen, P. I., Prenkert, F., Hoholm, T., & Harrison D., (2014). "The dynamics of networked power in a concentrated business network", Journal of Business Research, 67, 2579-2589.

Osland, J., Kolb, D. and Rubin, I. (2000) "Organizational Behaviour. An experimental approach". Prentice Hall

Pettigrew, A. (1973) "The Politics of Organizational Decision-making". London: Routledge

Plewa, C., Baaken, T., Korff, N., Rampersad, G. C., Johnson C., Macpherson, G. (2013) "The evolution of university–industry linkages—A framework" Journal of Engineering and Technology Management, Vol. 30, p. 21–44

Regjeringen. (2014). «Grønt skifte - klima- og miljøvennlig omstilling». Hentet 07.09.2015. https://www.regjeringen.no/no/tema/klima-og-miljo/klima/innsiktsartikler-klima/gront-skifte/id2076832/

Rosen, N. (1987) "Teamwork and the Bottom Line: Groups make a Difference". Lawrence Erlbaum Associates Publ.

Ritter, T., Wilkinson, I.F. and Johnston, W.J. (2004) "Managing in Complex Business Networks", Industrial Marketing Management, 33, pp. 175-183.

Schall, D. (2014) "A multi-criteria ranking framework for partner selection in scientific collaboration environments" Decision Support Systems, Vol 59, pp 1-14.

Shane, S.C, (1996). "Hybrid Organizational Arrangements and their Implications for Firm Growth and Survival: a Study of New Franchisors", Academy of Management Journal, Vol. 39 (1), 216-234.

Skurdal, M. K. (2015). «Kontrakt om FoU-prosjekt». Hentet 29.08.2015. http://www.forskningsradet.no/no/Kontrakt_og_rapportering/1183468209165

Spekman, R. E., Isabella, L. A. & McAvoy, T. C. "Alliance Competence". New York: John Wiley, 2000.

Teirlinck, P., Spithoven, A. (2013) "Research collaboration and R & D outsourcing: Different R&D personnel requirements in SMEs", Technovation vol. 33 p.142–153

Tjora, A. (2010.) "Kvalitative forskningsmetoder i praksis" Oslo: Gyldendal Akademisk, Print.

Thorsen, T. L. (2012) «Fakta om små og mellomstore bedrifter i Norge» Hentet 1.12.2015 http://www.bedreskatt.no/artikler/fakta-om-sm%C3%A5-og-mellomstore-bedrifter-i-norge

The National Research Ethical Committees, 2003 publ. 4, "Oppdragsforskning: åpenhet, kvalitet, etterrettelighet", Aktiv Trykk AS, Oslo

Tuckman, B. & Jensen, M. (1977) "Stages of small group development revisited", Group and Organizational studies, 2, s. 419-427.

Van de Vrande, V., De Jong, J.P., Vanhaverbeke, W., de Rochemont, M. (2009) “Open innovation in SMEs: Trends, motives and management challenges” Technovation vol. 29 pp. 423-437

Von Zimmermann, M., Engel, S., Baccarella, C., Voigt, K. (2012) “Contract Research as a Part of New Product Development” Technology Management for Emerging Technologies (PICMET), Proceedings of PICMET ‘12

Wilkinson, I.F., Marks, R., Young, L. (2002). “Toward Agent-based Models of the Development and Evolution of Business Relations and Networks”.

Wynstra, F., Pierck, E.t. (2000) “Managing supplier involvement in new product development: a portfolio model”, European Journal of Purchasing and Supply Management, 6, pp. 49-57.

Yin, Robert K. (2009) “Case Study Research: Design and Methods”4e. Vol. 5. Sage Publications Inc.

Zander, A. (1994) “Making groups effective”. San Francisco. Jossey-Bass

APENDIX A - INTERVIEW GUIDE

All numbered questions in **bold** are to be asked by the interviewer. Questions marked by dash (-) under the **bold** questions are examples of follow up questions if it becomes necessary to make the interviewee elaborate on the answer. Additional follow up questions are to be developed on the spot if the interviewer discovers interesting topics, relevant for the study. All questions in the guide are developed for a representative from a small enterprise, but are adaptable to suit an interview with a SINTEF representative.

Introduction:

"As you are informed about, our study is investigating relationships between research institutions and small enterprises's in an R&D-project. Your personal information will be kept secret, and answers in this interview will be recorded, transcribed and stored according to the regulations of The Norwegian Data Protection Authority."
1. Recording of interview ok?:

1 General information

Name:
Organisation:
R&D - project:
Organisation's relationship type during project:
Interviewee's role in relationship:
Funded by RCN:
Relevant background/previous experience:

2 Project / R&D-collaboration:

2. How did the process elapse?

- special phases?
- specific incidents?

3. Duration of project?

- over/under estimated plan?

4. What insights did you gain during the process? (ask this question again in the end?)

- specific knowledge/experience developed from project
- specific knowledge/experience developed from process
- any insight that could/should have been available before the project

5. Goals of project?

- how many?
- where they all met?
- edited during the process?

6. Was the project a success?

- Why / Why not?

- How could it have been better?

7. What defines a success for an R&D-project?

- 5 Why's...

3 Small enterprismall enterprises power

8. How was contact with research institution established?

- who initiated contact and presented the possibility of collaboration?

9. What made you decide on that specific research institution?

- experience/recommendations/reputation/specific knowledge etc.?
- did you have any alternatives?

10. How would you describe your degree of dependence towards research institution?

- How would you describe the degree of dependence from research institution towards you?
- Could you do R&D yourself?
- Could you outsource to others than the research institution in question?

11. What influence did you have on the research institution?

- How much were you allowed to set the course for the project?
- what did you have most influence over?
- what did you have the least influence over?
- did this change during the process?

12. How did the level of influence affect the process?

- did it affect your company
- did it affect you, your role or others involved from your company?

13. How did the level of influence affect the result?

- if level of influence was altered, would the result be different?

14. What experience regarding level of influence should one be aware of?

- anything specific for the small enterprises?
- anything specific for the research institution?

4 Power asymmetry

15. How will you define power in a R&D-relationship? If we define power by the ability to influence the partner:

16. How will you describe the level of power for the parties involved in the R&D-project?

- why was this the power distribution?
- did this change during the process?

- did you try to change it?

17. Did you define/distribute power in advance of the process?

- how did you distribute?
- was the distribution correct?
- did you redistribute power?

18. Were there situations the power should have distributed differently?

- Why?
- How should this distribution be performed?
- Did this become a topic at any occasion?

19. Any experience regarding power/influence that should be available in advance of project start?

- what should small enterprises know?
- what should research institution know?
- What sohuld you have known?

20. Any distribution regarding power that should be defined in advance of project start?- how should this be defined?

5 Industry Academia Collaboration

21. How was the initial response to the project?

- research institution immediately accepting or needing persuasion?

22. How was the process before initiation?

- Any negotiations?
- Project outline and requirements definitions?
- Contract definition and signing?

23. Did the research institution understand the small enterprises's need(s)?

- How was this ensured? (written agreement? workshop?

24. How did business match science during the project?

- Did the small enterprises participate the research?
- Did the small enterprises get technical insight?
- Did the research institution get technical insight from the small enterprises?

25. How was the communication?

- All meetings well structured?
- All emails answered within reasonable time?
- Any misunderstanding?
- Any miscommunication?
- Any disagreements?

26. How was the commitment?

- Both partners committed? To what degree?
- One more committed than the other?
- Was commitment discussed and agreed upon in advance or did it just evolve naturally?

27. Can you compare differences and/or similarities between cooperating with research institution vs cooperating with commercial industry?

- Did you reflect on the differences or similarities in the process?
- What could/should be more similar? 28. Are there any recommendations you would give to a small enterprise who is about to collaborate with SINTEF in product development?

29. Are there any recommendations you would give SINTEF regarding collaboration with a small enterprise?

30. Is there anything else you wish to say?

APPENDIX B – CODES

	Cathegories	Mentions	
Dependency ex	14	231	
Cooperative frames	17	291	
Activity	5	168	
Result	3	41	
Total		731	
Dependency	**Cooperative**	**Activity**	**Results**
Labour	Hidden agendaes	Power distribution	Ownership
Project experience	Contracts	Planning	Value
Technical Experience	Communication	Collaboration	Defining Success
Alternative Outsourcing	Experience	Learning	
Urgency	Inspired (by SMB)	Formalized processes	
Competitive advantage	Responsibility		
Resources	Expectation		
Screening phase	Trust		
Economic resources	Execution		
Knowledge transfer	Project management		
Competence	Responsibility		
Influence	Fasilitation / Philosophy		
Needs	Market knowledge		
Power definition	Relations		
	Claims		
	Commitment		
	Credibility		

APPENDIX C – Coding categories pre interviews

From Theory (Prior interviews)				
Code	**Definition/Context**	**Further Categories**	**Overall Category**	**Mentions**
Labour	bring external competence to the company	competence / labor / resources (critical)	Dependency ex	9
Project experience		SE hiring?	Dependency ex	15
Technical Experience		SE hiring?	Dependency ex	23
Defining Success		SE / RI	Result	7
Alternative Outsourcing	Alternative to SINTEF	Possible / not possible?	Dependency ex	10
Power distribution			Activity	37
Planning		project goals,	Activity	80
Urgency			Dependency ex	4
Hidden agendaes		TTO, transparency, hemmelighold, kommunikasjon	Cooperative frames	3
Competitive advantage	sier noe om fordelen med å bruke sintef	Unik ekspertise, ressurser, merkenavn	Dependency ex	6
Contracts	Legger grunnlaget for samarbeid, og reduserer maktforholdet	Kontrakter, formalisere, avtaler, rammeverk, forhandlingsmakt, mål, forventninger	Cooperative frames	32
Communication		Dialog, kommunikasjon, interaksjon, forventninger	Cooperative frames	54
Screening phase	Vurdere alternativer, noe likt "Alternative Outsourcing"	Alternative forskningsinstittusjoner, alternative samarbeidspartnere i industrien	Dependency ex	10
Economic resources			Dependency ex	16
Knowledge transfer			Dependency ex	28
Competence			Dependency ex	27
Experience	With managing R&D-projects	Erfaring	Cooperative frames	16
Resources			Dependency ex	14

APPENDIX D – Coding categories post interviews

From Interviews (Empiri analysis)				
Code	**Definition/Context**	**Further Categories**	**Overall Category**	**Mentions**
Inspired (by SMB)	Intervjuobjekt (SINTEF) blir inspirert til ekstra innsats		Cooperative frames	9
Responsibility	For å gjennomføre prosjekt / forandring i ansvarsområde		Cooperative frames	21
Expectation	Hva forventes (SMB forventer produkt)		Cooperative frames	32
Influence	I hvilken grad kan en part påvirke den andre		Dependency ex	17
Trust	Tillit		Cooperative frames	18
Execution	evne til igangsetting / gründerspirit / gjennomføring		Cooperative frames	18
Project management	Evne til å lede prosjektet, kan kobles mot erfaring?		Cooperative frames	26
Value	Hva man får for det man betaler		Result	20
Responsibility	Ansvar / samfunnsansvar		Cooperative frames	-
Needs	Hvilke behov har de ulike partene		Dependency ex	15
Power definition	hva er power i et F&U-samarbeid		Dependency ex	37
Fasilitation / Philosophy	Villighet til å samarbeide med smb		Cooperative frames	2
Collaboration	Kvalitet på samarbeidet		Activity	33
Learning	Læring underveis		Activity	10
Market knowledge	Kundens markedskunnskaper blir benyttet i gjennomføringen	end user needs	Cooperative frames	12
Relations	Tidligere relasjoner påvirker prosessen		Cooperative frames	11
Claims	SMB stiller krav		Cooperative frames	13
Commitment	Engasjement		Cooperative frames	22
Formalized processes	HMS, rapportering, salgsrutiner, andre rutiner internt i SINTEF		Activity	8
Ownership	rettigheter / ansvar		Result	14
Credibility	har man SINTEF sin respekt som uerfaren bedrift?		Cooperative frames	2