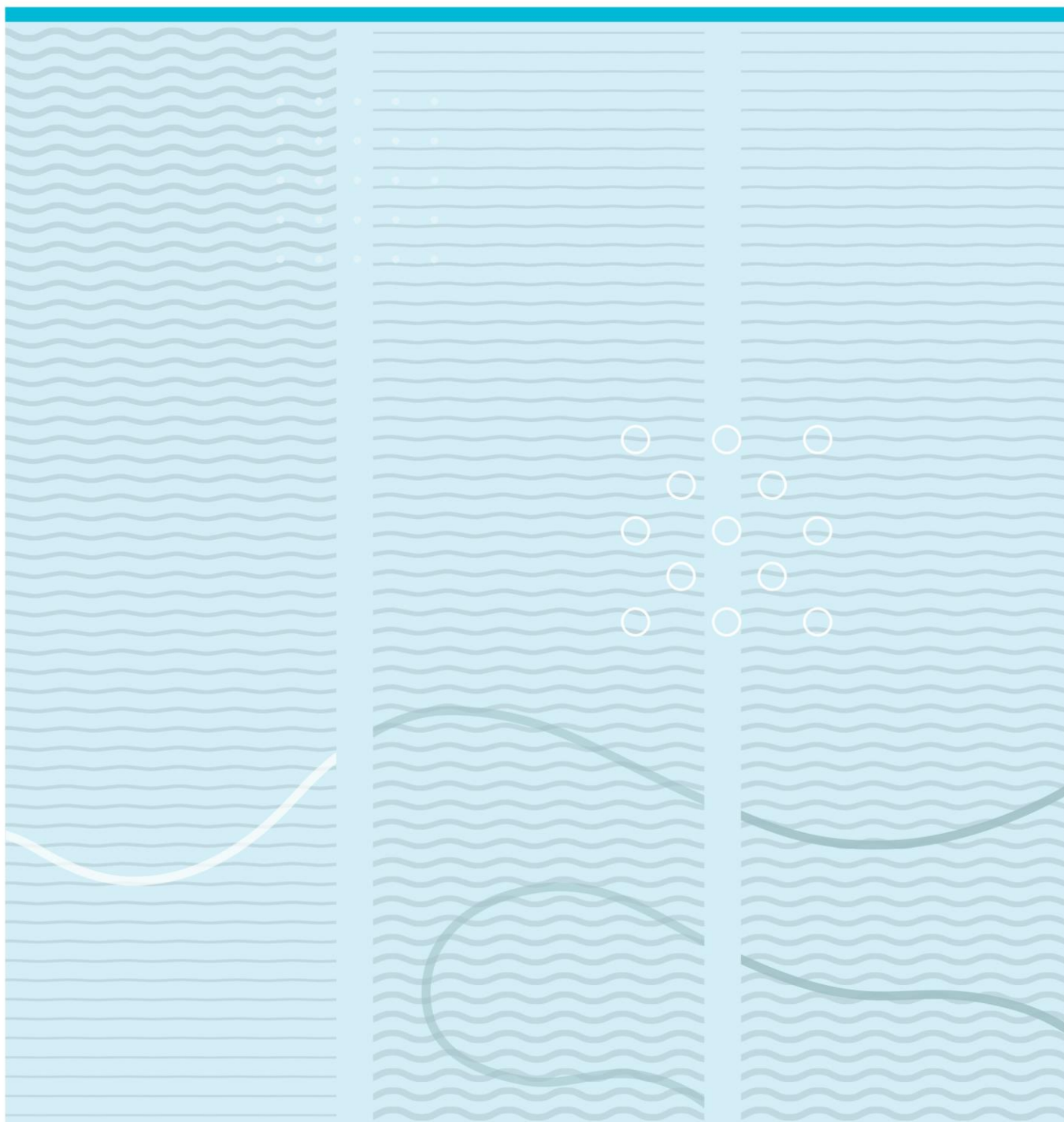


Anujan Puventhiran  
Ender Tugsuz

## Innovation and R&D Outsourcing

*A qualitative study based on Norwegian R&D firms' experiences with R&D outsourcing and innovation development*



Høgskolen i Sørøst-Norge  
Handelshøyskolen  
Institutt for industriell økonomi, strategi og statsvitenskap (IØSS)  
Postboks 164 Sentrum  
3502 Hønefoss

<http://www.usn.no>

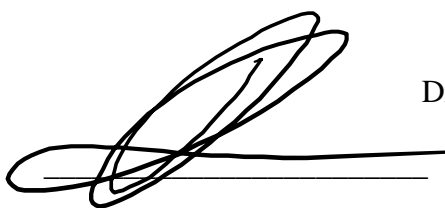
© 2017 Ender Tugsuz & Anujan Puventhiran

Denne avhandlingen representerer 30 studiepoeng

## Preface

This thesis is the final part of the master's degree program in Economics and Management with specialization in Industrial Economics, at the University College of Southeast Norway. The inspiration of this thesis dates back to spring 2016, when we examined literature about the developing trends in the world of innovation. One of these trends was the rising awareness on R&D and the outsourcing of this function. Before the initiation of this thesis, we examined the literature deeper, and identified areas that could benefit from further contributions. We based our topic on outsourcing of R&D and its relationship with innovation, related to gaps that weren't covered by previous literature.

We have come across many frustrating situations and challenges throughout the deliberation of this thesis. The most time-consuming part was to sharpen the problem area and highlight the purpose of our research. After analyzing countless literatures including a wide-range of reports, articles, books, etc., related to the topic, we finally manage to develop our research questions. The rest of the process wasn't necessarily challenging, but we did stumble upon some difficulties to get in touch with firms to participate in our study. We would like to thank the representative from Innovation Norway (Innovasjon Norge) for helping us to find these firms. We would like to express our gratitude to our informants who provided us with valuable information and made our research possible. Last but not least, we want to give or special thanks to our supervisor Fahad Awaleh for his exceptional guidance and support throughout this semester.



Ender Tugsuz

Drammen/Oslo, 15<sup>th</sup> May, 2017



Anujan Puventhiran

## Abstract

The purpose of this thesis is to find out the criteria behind firms' decision to outsource the R&D function, and the factors that support/constrain their goal of enhanced innovation. In order to cater the market changes and the technological development, many firms chose to focus plenteously on core functions such as R&D. R&D emphasizes processes that can contribute to innovation development, and the driving-force behind this trend is that there is a rising awareness on that innovation and knowledge associated with R&D, is created outside a firm's own boundaries. Outsourcing R&D has shown to improve innovation and overall firm-performance, but only if it is properly planned and executed. Based on an intense literature review within this topic, we have managed to form these following research questions:

- *What criteria underpinned firms' decision to outsource R&D?*
- *What factors support or constrain firms from meeting their goal of enhanced innovation?*

To answer these questions, we conducted a qualitative study consisting of seven comprehensive interviews. In order to retrieve valuable and reliable information, these interviews were made with central representatives from various R&D firms in Norway. The information we retrieved from these interviews were analyzed and discussed with references to literature.

Based on theoretical and empirical evidence, the criteria behind the decision to outsource R&D were primarily based on a firm's competency, resource and flexibility (time and adaptation). Generally speaking, both theoretical- and empirical evidence shows that firms who outsourced R&D, gained better advantages in terms of innovation development.

However, too much dependency on outsourcing could inhibit a firm's ability to acquire knowledge and experience related to the issue they are trying to resolve. Regarding the second research question, our informants suggested internal innovation-networks, sharing culture, financial support, encouragement of risk-taking, and cooperation between specialists and firms as innovation enhancing factors. The factors that constrained innovation was over-outsourcing the R&D function, down-prioritizing internal development, financial barriers, and bad communication between the parties. According to our findings, these constraints can significantly inhibit innovation development.

Separate from the research questions, we discovered some additional findings such as non-innovative motives behind R&D outsourcing: E.g.: business-models, cost-savings and development of non-innovative products and services. Additionally, the informants had highly optimistic predictions on the importance of R&D in the future, and expected the market for outsourcing to be even greater.

## Definitions of frequently used terms

**Innovation:** “Market introduction and commodification of new products, services, processes and ideas”. (Schumpeter, 1934); (Mowery, Nelson, & Fagerberg, 2005, p. 5).

**Research & Development (R&D):** R&D is defined as the process of creating new products, processes and technologies that can be used and marketed for mankind’s benefit in the future” (Bernstein, 2016, p. 3).

**Outsourcing:** “Outsourcing is the procedure of acquiring external workforce/contractors to cover specific functions that would have been otherwise performed by the firm itself” (Lankford & Parsa, 1999, p. 312).

**Insourcing:** “Insourcing is the process of allocating and/or reallocating resources internally within the firm” (Schneiderjans & Schneiderjans, 2005, p. 3).

**Transaction Cost Economics (TCE):** TCE is the theory of accounting for the governance structure and actual costs of outsourcing business-activities. This can be broken down into various costs such as transaction costs, contracting costs, coordination costs, and research costs (Williamson, 2008, p. 5).

**Knowledge:** “A definition of personal knowledge, with the aim of providing an expanded concept which, in turn, will allow more productive discussions of assessment, knowledge management, individual and organizational performance and training” (Hunt, 2003, p. 100).

**Effectiveness:** “Effectiveness refers to the intervention’s ability to do more good than harm for the target population in a real world setting” (Schillinger, 2010, p. 2).

## List of Figures

figure 1: R&D-cooperation amongst Norwegian firms according to SSB (2017).....	17
figure 2: R&D-investments in the EU and Scandinavia .....	19
figure 3:Community Innovation Survey – CIS .....	20
figure 4: Proportion innovated vs. time (Bakhtiari & Breunig, 2013) .....	22
figure 5: McCracken's four-step model (McCracken, 1988).....	36
figure 6; Nodes from Nvivo (see the appendix for a more comprehensive version) .....	48
figure 7: From R&D-Outsourcing to Innovation .....	77

## Content

<b>1</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	Historical background .....	1
1.2	The Trend and Challenges of Outsourcing R&D.....	3
1.3	R&D and Innovation.....	4
1.4	Accumulation of the research question .....	5
1.4.1	Research questions .....	6
1.4.2	Limitation of the research area.....	7
1.4	Structure of the thesis .....	8
<b>2</b>	<b>THEORY REVIEW .....</b>	<b>9</b>
2.1	Innovation .....	9
2.1.1	Innovation Survival .....	10
2.1.2	Several types of innovation .....	11
2.1.3	R&D's role .....	14
2.2	The Situation in Norway .....	16
2.2.1	Norwegian R&D .....	18
2.3	Outsourcing.....	21
2.3.1	Insourcing.....	23
2.3.2	Economic Effects of Outsourcing .....	25
2.4	Summary of Theories.....	26
<b>3</b>	<b>METHODOLOGY.....</b>	<b>28</b>
3.1	Research Design.....	28
3.1.1	Choice of research design .....	29

3.1.2	Case study .....	30
<b>3.2</b>	<b>Selection of Informants.....</b>	<b>32</b>
<b>3.3</b>	<b>Methods for collecting of data.....</b>	<b>34</b>
<b>3.4</b>	<b>Interview guide.....</b>	<b>35</b>
3.4.1	McCracken’s four-step method for examinations.....	35
<b>3.5</b>	<b>Coding and transcribing.....</b>	<b>38</b>
<b>3.6</b>	<b>Reliability.....</b>	<b>40</b>
<b>3.7</b>	<b>Validity.....</b>	<b>41</b>
<b>4</b>	<b>PRESENTATION OF FINDINGS.....</b>	<b>44</b>
<b>4.1</b>	<b>Brief introduction of the informants.....</b>	<b>45</b>
<b>4.2</b>	<b>Nvivo and categorization of the findings.....</b>	<b>47</b>
<b>4.3</b>	<b>Informants’ definition of R&amp;D and Innovation.....</b>	<b>49</b>
4.3.1	R&D definition.....	49
4.3.2	Innovation definition.....	51
<b>4.4</b>	<b>R&amp;D Outsourcing and Innovation.....</b>	<b>53</b>
4.4.1	Disadvantages of Outsourcing R&D.....	56
<b>4.5</b>	<b>The Situation in Norway.....</b>	<b>58</b>
<b>4.6</b>	<b>Future of R&amp;D, and other motives for outsourcing R&amp;D.....</b>	<b>62</b>
<b>5</b>	<b>DISCUSSIONS.....</b>	<b>65</b>
<b>5.1</b>	<b>Discussion of the Interview’s Validity.....</b>	<b>65</b>
<b>5.2</b>	<b>Discussion related to theory.....</b>	<b>67</b>
5.2.1	Criteria to outsource R&D.....	67
5.2.2	Factors that support enhanced innovation.....	70
5.2.3	Factors that constrain enhanced innovation.....	73
5.2.4	Other findings.....	75
<b>6</b>	<b>CONCLUSION.....</b>	<b>77</b>
<b>6.1</b>	<b>Limitations.....</b>	<b>79</b>
<b>6.2</b>	<b>Further Research.....</b>	<b>80</b>
<b>7</b>	<b>Reference List.....</b>	<b>82</b>
<b>8</b>	<b>APPENDIX.....</b>	<b>88</b>
<b>8.1</b>	<b>Interview Guide.....</b>	<b>88</b>
<b>8.2</b>	<b>Interview Request.....</b>	<b>92</b>
<b>8.3</b>	<b>Nvivo.....</b>	<b>94</b>



*This page intentionally left blank*

# 1 INTRODUCTION

---

The topic of this thesis is based on the outsourcing of the R&D function and its association with innovation. Based on statistical data, Norwegian firms' R&D investments are on an all-time high, and its growth isn't expected to diminish any time soon. Some speculate that the main driver of this growth is linked towards the oil crisis and firms' desperate need of innovation to break free from their restraints and to capture new opportunities. To process this transition more efficiently, many firms have chosen to outsource their R&D functions to various specialists. Despite many scientific contributions to the concepts of R&D, outsourcing and innovation, an examination of their relationship from firms' perspective remains fairly untouched, and this creates a purposeful base for our thesis.

## 1.1 Historical background

Mostly during the 20<sup>th</sup> century, a company was characterized as successful if it had the ability to own, manage and develop all their products and processes themselves. A well-integrated company signified productivity and control. However, this type of traditional belief was to change towards the early 80's due to the increase in market globalization. The driving forces behind the increased globalization were mostly due to the fall of the Soviet Union and the breakdown of trade barriers between various regions and continents. Reduction of custom fees, trade restrictions, new trade agreements between regions and lands (e.g. EEA), opened new markets for firms to sell their products and services to. Additionally, the population of the earth had continued its growth in pace with the economic development, which also led to the growth of the middle-class. In other words, globalization meant more consumers, more

consumers meant bigger demand. The bourse also played a huge role for financial growth as investors received more money than ever before. Such implications forced traditional companies to experiment with new opportunities and strategies, which boosted the technological development rate and shortened products' lifecycles. Slow firms who couldn't cope with development rate, could expect to lose significant amount of market shares as well as resources (Micklethwait & Wooldridge, 2003);(Godin, 2008).

In order to cater the increasing demand, market changes, and technological development, many firms chose to focus plenteously in selected core-areas, which the literature refers to as e.g.: core competence, core operations, core functions and core business (Butterworth, Westdijk, & Magnus, 2013). Focusing on specific core areas shaped firms into becoming more specialized (Quinn, 2000). Specialization led to increased division of value-chains and segmentations, and increased competition in both domestic- and international markets. For many firms, specialization had become a necessity to survive, to invest, and to remain relevant (Corbett, 2004).

To keep up with the growing technological pace, firms had to make some clear choices. Eventually, firms see themselves prioritizing what tasks they should be doing internally and what tasks they should buy from others. The outside-in perspective became the favorable approach for non-core tasks as firms could increase their focus on core development. However, in a world of fast technological development and quick adaptations, many firms gradually began to outsource core functions as well (Corbett, 2004).

## 1.2 The Trend and Challenges of Outsourcing R&D

Imbalances between what firms possessed and what they wanted to achieve, led to the extensive need for specialization. In cases where certain attributes weren't available within, firms relied on external help that could provide with necessary functions (Corbett, 2004); (Quinn, 2000). Since this trend grew rapidly due to the technological advancement in the early 80's, this form of strategy received a specific definition: «*outsourcing*». Chase et al. (2004, p. 372) defined outsourcing as “*The act of moving some of a firm's internal activities and decision responsibilities to outside providers*”. Some firms choose to outsource non-core areas to outside providers in order to free up resources and focus deeply on core development (Gobble, 2013). Other firms chose to outsource core areas to allow outside providers strengthen firms' core functions. E.g. Tesla, a company known for their achievements of innovation, outsourced most of their core functions during their early stages. By retrieving external expertise, they managed to become one of the biggest game-changers in the automotive industry (Baer, 2014). Research and development, henceforth: R&D, emphasizes the process of developing new, hitherto unknown possibilities, that can contribute to innovation development (Hsuan & Mahnke, 2010). The drive force behind this trend is that there is a rising awareness on that innovation and knowledge associated with R&D, is created outside a firm's own boundaries, thus making outsourcing a necessary approach to consider (Howells, 1999). According to Howells (1999), outsourcing R&D can help to maximize innovation and overall firm performance, but only if it is properly planned and executed.

Outsourcing R&D is unfortunately not an easy task to accomplish, and brings a lot of challenges with it. R&D is an essential piece of a firm's core, and its importance must be understood before it can be outsourced. Many firms have failed to achieve their goals and

ambitions with R&D outsourcing due to bad planning and strategic errors. A common pitfall of R&D outsourcing is relying too much on the external provider and becoming unable to stand on your own feet. Too much dependence on outsourcing can inhibit a firm's ability to gain knowledge and experience related to the issue (Won, 2015). It can also require more resources than previously thought as the process can become very complex and hardly collaborative (Han & Bae, 2013). In some cases, choosing not to outsource R&D can be the right decision. By focusing on internal growth, firms can retain knowledge within the spectrum of the conflicts they are trying to resolve (Mark E. Atikins, 2016). The inside-out perspective can also be beneficial for developing and/or improving firm's own R&D division, which can reduce the firm's dependability on external help (Rilla & Squicciarini, 2011). Whether R&D is outsourced or not, its objective is to create new technology or information than can improve the effectiveness of products or make the production of products more efficient (Edquist, 2005). Therefore, a firm's innovative capability is highly related to the efficiency of their R&D function.

### **1.3 R&D and Innovation**

Research and Development (R&D) can also be described as a systematization of a creative work. Outsourcing R&D functions could especially boost innovation by obtaining expertise and knowledge, that weren't available to the firms beforehand (Noya & Canal, 2015).

Findings from a study on the relationship between outsourcing and innovation amongst firms, suggested that combining these two increased the likelihood of obtaining innovation (Bakhtiari & Breunig, 2013).

Innovation makes it possible to apply new ideas which can improve the quality of a firm's products and services, thus making it an important tool to gain market shares and knock out competitors (Godin, 2008). According to the OECD (Organisation for Economic Co-Operation and Development) innovation can go way beyond R&D: "*It goes far beyond the confines of research labs to users, suppliers and consumers everywhere – in government, business and non-profit organizations, across borders, across sectors, and across institutions*" (OECD, 2017, p. 1). Technology, products and sales-strategies can easily be copied by the competitors, but through innovation, a firm can obtain non-replicable attributes (Drucker, 1993).

## **1.4 Accumulation of the research question**

Recent studies suggest that trend of outsourcing R&D is continuing to build (Gobble, 2013). A survey by Oshri & Kotloarsky (2011) showed that 53 percent of 250 firm leaders who participated in the study, believed that outsourcing innovation activities contributed to the firm's overall performance, and the provider's innovation capabilities were an attractive factor in terms of getting selected. However, as the trend of outsourcing R&D blossoms, questions regarding its possible downsides are arising (Hsuan & Mahnke, 2010). Outsourcing innovation activities doesn't always work without perils. E.g. Boeing's experience with outsourcing innovation ended up in missteps and failure due to bad planning, coordination issues, and extensive outsourcing (Denning, 2013). Boeing is not the only company to experience such failures, since many modern companies are generally going too far in outsourcing critical functions (Denning, 2013). A study presented in the *MIT Sloan Management Review Journal*, suggests that outsourcing too much or too little by just 1 percent resulted in an 11 percent decrease in innovation efficiency (Stanko, Bohlmann, &

Calantone, 2009). Further contributions suggest that innovation can be facilitated faster and more efficiently by outsourcing R&D (Mahnke, 2006). However, recent studies also suggest that outsourcing R&D can be prone to failures, thus forcing firms to “back-source” R&D (Gobble, 2013). Evidences from these literatures point towards that outsourcing R&D can be a very challenging task to accomplish in a proper manner. Taken together, the literature shows that some firms can benefit, while some might lose with the increase in the degree of R&D outsourcing (Hsuan & Mahnke, 2010).

### **1.4.1 Research questions**

As with any strategic tool, R&D outsourcing must be applied in the right way, and in the right time to be efficient. To summarize, we have gained insight about the potential consequences of outsourcing R&D, but we know very little regarding the criteria behind firms’ decision to outsource R&D. Additionally, previous literatures on this subject are very biased towards objective analyzes, and is too vague to highlight which factors that can support or constrain firms from achieving enhanced innovation. If we can understand these factors more thoroughly, it might change our perspective on how R&D affects innovation. Based on these arguments, we have formed two research questions:

- *What criteria underpinned firms’ decision to outsource R&D?*
  
- *What factors support or constrain firms from meeting their goal of enhanced innovation*

## **1.4.2 Limitation of the research area**

From our standpoint, we believe that a qualitative study amongst Norwegian R&D firms is the most optimal area to approach these research questions. A qualitative study is suitable to examine this subject as we can gather in-depth information from firms that will provide us with the right empirical evidence to increase our conclusion's reliability and validity. As we will fill gaps which previous literature haven't covered, our contributions will hopefully increase the general knowledge about outsourcing of R&D and its implications on innovation.

The situation in Norway is an interesting example regarding the importance of innovation. For many decades, the Norwegian economy has been highly dependent on natural resources such as oil and gas, and therefore the need for innovation was often overlooked and underrated (Fagerberg, Mowery, & Verspagen, 2009). According to SSB (Statistics Norway) the growth in Norwegian R&D activity is stronger than in the EU and other Scandinavian countries (Frank, Berrios, & Fondevik, 2017). The growth of R&D in Norway has especially arisen since the recent oil crisis, and signified the need for innovation (Eurostat, 2016). According to a study conducted by Ernst & Young, one of the most important drivers of outsourcing services amongst Nordic countries is the need for expertise and knowledge (Butterworth, Westdijk, & Magnus, 2013). Currently, Norwegian firms are outsourcing approximately 10 percent of their business activities. Amongst them, 27 percent are associated with core areas, while the remaining 73 percent are associated with non-core areas (Butterworth, Westdijk, & Magnus, 2013). We believe that all these factors above make Norway a great framework to pick our research candidates from. We also believe that a mix of differently sized firms, will improve the generalizations of our findings.



## **1.4 Structure of the thesis**

This thesis is structured with six chapters. The first chapter was the introduction, where we have presented the historical background of the concepts, clarified the issues, presented the research questions and the research area. The second chapter is the core of the theoretical framework where we have present relevant literature and findings from previous contributions. The third chapter includes theory about the methodology we have used, justification of our choice of methodology, and information about the selection- and analyzation process. The fourth chapter builds up on the previous one by presenting our findings from the interviews. The fifth will address discussions with theoretical- and empirical evidence to answer our research questions. The sixth and final chapter will provide a conclusion, limitations of our thesis, and further research.

## 2 THEORY REVIEW

---

The purpose of this chapter is to provide a theoretical insight into the concepts: innovation, R&D and outsourcing, and will act as the underlying foundation for the rest of the thesis. Firstly, we have introduced the concept of innovation, its varieties, and R&D's connection with innovation. We have then presented the situation in Norway based on statistical-data and studies amongst firms associated with innovation- and R&D processes. Here we have introduced noticeable R&D trends, and interesting findings about innovative characteristics of Norwegian firms. After this subchapter, we have presented the concept of outsourcing, the importance it plays for R&D and innovation, and various factors that could influence its decision. In the end of this chapter, we have provided a summary to highlight what previous contributions have managed to capture so far, and what still needs to be further examined.

### 2.1 Innovation

Innovation is a concept which has been commonly used in modern day society and is a popular concept in several fields. Innovation has a signification of “newness”, “success” and “change” (Assink, 2006). Garcia & Calantone (2002) are pointing out that the term of innovation can be defined in different ways, because it can be used in various contexts which can be understood differently by the reader. Therefore, it is important to know the difference between invention and innovation – *an invention is where an idea will be created, an innovation is where one idea is created, developed and implemented in reality* (Garcia & Calantone, 2002, p. 111). An innovation can be; (1) a new product or service, (2) a new production process technology, (3) a new structure or an administrative system, or (4) a new

plan or program according to the members of an organization (Damanpour F. , 1991).

Innovation can thereby have different interpretations; it can include the activity itself, and/or the result of an activity.

### **2.1.1 Innovation Survival**

The abilities to create and/or develop new products and processes, are necessary to be able to survive intense changes in the markets (Godin, 2008). Baumol (2002) argues that high degree of competitiveness in the market forces firms to invest further in innovation, to manage uncertainties and to capture new opportunities more efficiently. Gjelsvik (2007) emphasises this by stating that it is a necessity for every firm to be able to adapt to changes in the environment, technology and in the market. He has also stated that companies need to be innovative in parallel with the changes in business strategies and intern organizations. In another way, to be innovative means to be able to adapt to changes in strategic areas (Gjelsvik, 2007).

To summarize this topic: a firm can use innovation in several strategic areas; (1) to achieve competitive advantage, (2) to compete effectively in both local and global markets, (3) to adapt a strategy to a changing market, (4) to create value and growth, or (5) to achieve superior performance (Subramaniam & Venkatraman, 1999); (Amit & Zott, 2001); (Grimm & Smith, 1997). Product innovation is as important as process- and service innovation to achieve competitive advantages (Tidd, Bessant, & Pavitt, 2005). Innovation is therefore very essential and attractive for all sorts of firms. However, not all of them are facilitated in a way to capture this feature as effectively as others do.

## 2.1.2 Several types of innovation

The concept of innovation was firstly presented by Joseph Schumpeter. Schumpeter was a well-recognized economic scientist and was the first person to introduce the concept of innovation in the studies of economics and management, and his work is still used in recent studies. He defined innovation as: “*market introduction and commodification of new products, services, processes and ideas*”. (Schumpeter, 1934); (Mowery, Nelson, & Fagerberg, 2005, p. 5). Schumpeter divided innovation in five types, and they are widely recognized in innovation studies. We have presented these typologies in this chapter because outsourcing of R&D could affect each one of them differently, and it is therefore very important to define these prior to our discussions.

### 2.1.2.1 *Product- and service innovation*

Schumpeter defines product innovation as “*The introduction of a new good – the one which consumers are not yet familiar with - or of a new of a good*” (Schumpeter, 1934, p. 66).

Product innovation is the development of new products through using new techniques and facilities, in current production methods or by changing the current product design. It focuses on existing markets to differentiate their existing products through functions and characteristics that current offers do not possess. Product innovation can be shown in two ways: an internal perspective where it depends on knowledge, capacities, resources and the technologies used in the company, and an external perspective which focuses on the consumers’ needs and the owner’s expectations. (Mowery, Nelson, & Fagerberg, 2005). In other words, it is about “giving” more to the customer.

### **2.1.2.2 Process innovation**

According to Schumpeter, process innovation is the introduction of a new production method that is characterized as scientifically new, and that has not yet been tested in practice (Mowery, Nelson, & Fagerberg, 2005). A research shows that process innovation can lead to improved production efficiency, better quality, higher productivity and less collaboration which can reduce the total production costs. Process innovation can be divided into two types; technological and organizational. The technological type refers to the direct effects to the firm activities, like machines and new methods to keep the production line running. Organizational type focus on new ways to organize work and affects the activities indirectly, mostly through management systems. (Gjelsvik, 2007); (Damanpour & Aravind, 2011). Additionally, process innovation can enhance profit margins by reducing “waste”, with the aim to remove a step in the process that doesn’t increase the value of the product (Moore, 2006).

### **2.1.2.3 Market Innovation**

Schumpeter defined market innovation as “*the opening of a new market, that is a market into which the particular branch of manufacture of the country in question has not previously entered, whether or not this market has existed before*” (Schumpeter, 1934, p. 66). It’s an innovation that satisfies customer’s needs and develops a competitive advantage through differentiation in the markets (Mowery, Nelson, & Fagerberg, 2005). How firms are focusing on new segments and customer groups, are both a part of market innovation. Furthermore, market innovation can enhance distribution- and sale methods, which can promote changes to products and services (Breiby, 2012).

#### **2.1.2.4 Incremental and Radical Innovation**

The two most commonly used concepts to measure the degree of differentiation in innovations are incremental and radical innovation (Schilling, 2010).

Innovation that improves existing solutions is defined as incremental innovation: e.g. a small incremental adjustment or an enhancement of a product or a component of a system (Schilling, 2010). In other words, this could be interpreted as an intention to present a better overall product to the customer. Typical features of incremental innovation are cost benefits, minor modifications or new features to existing products, change of design, creation of new organizational routines, procedures and standards for more efficient production, all through the base of knowledge which comes from the perspective of the customers (Dodgson, 2008). According to Harvard Business Essentials (2003): incremental innovation involves exploiting and improving existing technologies, as well as configuring them to serve new purposes.

Radical innovation is an introduction of new products that can outcompete the existing products in the market. It occurs when innovation provides the customer more benefits from the existing product or service, thus changing the customer's preference and behaviour. The typical features of radical innovation are openness for ideas outside the organization, creation of new links and relationships, adjustments the organization to ensure extensive involvement in exploratory activity, and bringing new properties/attributes by hiring new competency. Christensen & Raynor (2003) stated that incremental and radical innovation lays on a common development axis. This is because they will both contribute to give the customer an experience with better functionality, than what they had before. Shortly put, the result of

incremental and radical innovation will be an improved version of the existing product. (Christensen & Raynor, 2003).

Fitjar & Rodriguez (2012) argues that in general, Norwegian firms tend to implement new innovations quite rapidly to keep productivity levels flowing. In such circumstances, ground-level research and scientific studies might be down-prioritized to decrease the time duration between the initiation and implementation of the desired innovation. This is a part of what the OECD had labelled as “*the Norwegian paradox*”: a combination of low R&D expenditure and high productivity that is explained by Norway’s reliance on resource-based industries with frequent incremental process innovations, but only few radical product innovations (OECD, 2007).

### **2.1.3 R&D’s role**

Research and Development (R&D) can be described as a systematisation of a creative work. The objective of R&D is to create new technology or information than can improve the effectiveness of products or make the production of products more efficient. R&D can also be used to create a base for innovations, through the development of technological knowledge. Usually, R&D was a common practice in universities and governmental research institutes, but in recent years, many firms have also specialized in this area (Edquist, 2005). The involvement of R&D firms generated more attention on R&D, and made knowledge associated with it available for other firms, organizations, and individuals. Gradually, R&D investments became a common practice, and more and more firms started to follow this trend. Today, most firms involved with innovation activities, have some affiliation with R&D, either

by developing their own R&D, or by retrieving knowledge about this area from specialists (Howells, 1999).

R&D's association with core competence was firstly introduced by Prahalad and Hamel (1990). Core competency is the development of internal knowledge related to skills to coordinate and integrate technological products. The authors suggest that firms who can effectively identify and foster their core competencies, can obtain sustainable competitive advantages (Prahalad & Hamel, 1990). Seddighi & Huntley (2007) conducted a study to find out whether firms emphasised the use of R&D to develop their core competencies or not. Based on the results, 23 out of 25 firms said that they focused plenteously on R&D activities to identify their core competencies. This result is also supported by the theoretical contribution of Klein et al. (1998), that core competency are in fact better managed through R&D practises.

In a global perspective, the biggest investors in R&D come from from Asian countries. China, Japan and South Korea are accounted for more than 40 percent of all global R&D investments, where North American investments are less than 30 percent, and European R&D investments are slightly above 20 percent (Industrial Research Institute, 2016). Evidence shows that North America and Europe have started to lose their global R&D share values on a yearly basis. Recent figures show that China had an annual growth of more than 10 percent since the 90's, but this rate has decreased to 7 percent in 2016. The growth rates of both in North America and Europe are in the range from 2 to 3 percent. The rest of the world; Russia, Africa, South America and the Middle East, have an average growth of only 1,5 percent per year in R&D investments (Industrial Research Institute, 2016). Although leading Asian economies make up for the biggest fraction of the global R&D investments, the tables may



turn in the future due to the growth in yearly investments in R&D amongst western countries. This could also signify the increased awareness on the importance of R&D, and the role it plays in developing an innovative and sustainable industry.

## **2.2 The Situation in Norway**

Norway is highly influenced of innovation in geographical areas where high-tech products are vastly accessed, and these areas can often be categorized as “technology-cities”. Knowledge about different industries and products are fundamental for innovation development. This concerns industries that are characterized with high R&D intensity, service companies with advanced custom technologies and a large number of workers with high education. It is also important to notice that these high-tech industries only represented 5 percent of total available jobs in Norway. Industries that are placed in smaller towns are mainly aimed for international markets, and the rest are mostly for regional and national sales (Onsager & Johnstad, 2007).

A study on approximately six thousand firms in Norway found out that the degree of collaboration between Norwegian firms for innovative-purposes had slightly decreased over the years (Wilhelmsen & Foyn, 2014). The number of firms who collaborated was reduced from 44 to 40 percent between 2012 to 2014. According to Wilhelmsen & Foyn (2014) the main reason for less collaboration on innovation was due to firms’ difficulties of finding the right sparring partners for innovation. A similar study suggested that cooperation with competitors could harm a firm’s innovative ability due to heterogeneity related conflicts (Fitjar & Pose, 2013). However, firms who collaborated with external agents instead of competitors, had an overall higher innovative performance than firms who didn’t collaborate at all (Wilhelmsen & Foyn, 2014). According to Aksnes et al. (2015), if a partnership is

linked to science-and technology related innovation, collaborations in those areas are generally expected, and are directly associated with product innovation. A previous study by Fitjar & Pose (2011) showed that collaboration with universities and research-institutes brought a significant boost to the degree of product innovation. Based on their findings, the likelihood of total product innovation was 35 percent higher for Norwegian firms that cooperated with science- and technology institutes.

Figure 7. Cooperation partners in R&D activity. Per cent of enterprises with R&D cooperation. 2015<sup>1</sup>

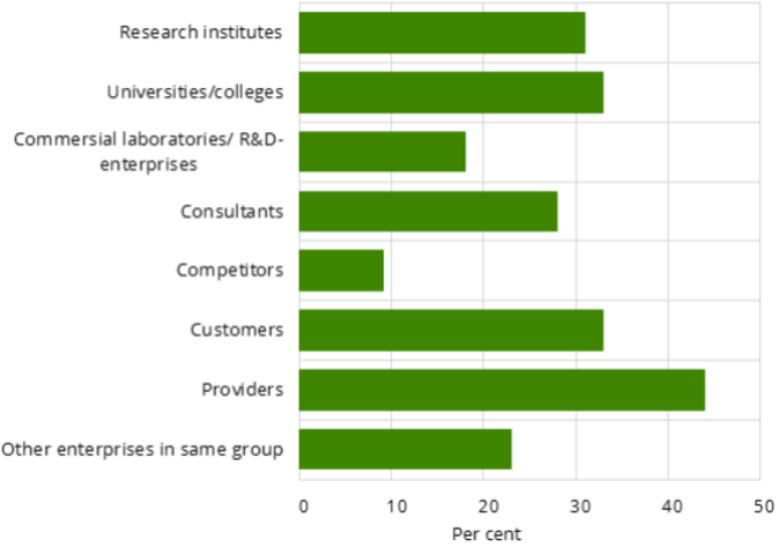


figure 1: R&D-cooperation amongst Norwegian firms according to SSB (2017)

The graph above shows the distribution of R&D partners amongst Norwegian firms (the total sum exceeds 100 as some firms have multiple cooperation partners). Approximately 31 percent have mentioned to cooperate with research-institutes and another 33 percent with universities/colleges (Frank, Berrios, & Fondevik, 2017).

### 2.2.1 Norwegian R&D

R&D is needed to create new and better solutions that can be traded to a value on the market. Innovations have received increased attention in today's economy, and it is particularly important for Norwegian firms to be able to deal with the globalized competition. Firm leaders and politicians alike, are aware of the importance of investing in R&D, and how necessary it is to obtain a solid competitive advantage (Nærings og Handelsdepartementet, 2012).

Most of the research activities in Norway were found within industry-rich cities and cities with leading universities and research-institutes. The four largest measured regions of R&D activity were Oslo, South region of Trøndelag, Akershus and Hordaland. All together, they had 72 percent of the country's total R&D expenditure. Southern part of Trøndelag region had the highest R&D activity measured in NOK per capita, followed by Oslo, Tromsø, Akershus and Hordaland in chronological order (Spilling, Sandven, & Gunnes, 2014).

The business community in Norway (Næringslivet) conducted a research to find out exactly how much Norwegian firms spent on R&D investments from 2013 to 2014, which was approximately when impact of the oil crisis was at the biggest (Eurostat, 2016). The results showed that total R&D investments was estimated to be around 24.8 billion in 2014, which was a 10 percent increase from previous year. This major growth was stronger than what was accomplished in the EU and Scandinavia alike (Foyen, Berrios, & Fondevik, 2016).

Interestingly, Reve (2014) stated that Norwegian investments needed to restructure from the oil industry towards an innovation driven economy, prior to the report from SSB (Statistics Norway).

This can in further indicate that the oil crisis played a significant role in the rapid growth of R&D investments during that period. According to newest data from SSB, the growth in Norwegian R&D activity remained stronger than in the EU, with a 12 percent increase from 2014 to 2015 (Frank, Berrios, & Fondevik, 2017).

Figure 1. Performed R&D man-years in business enterprise sector in nordic countries and EU28. 2005=100

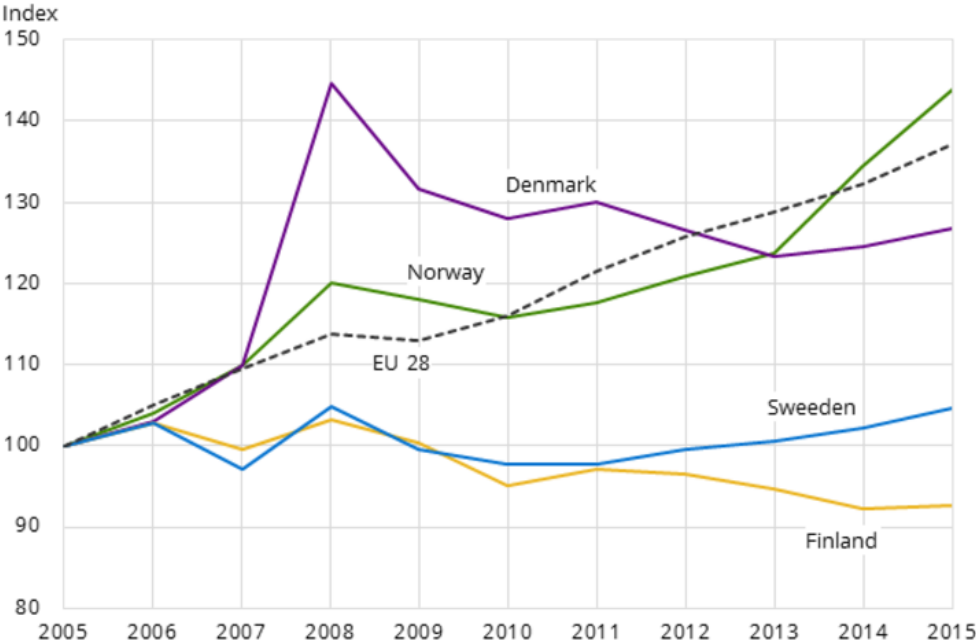
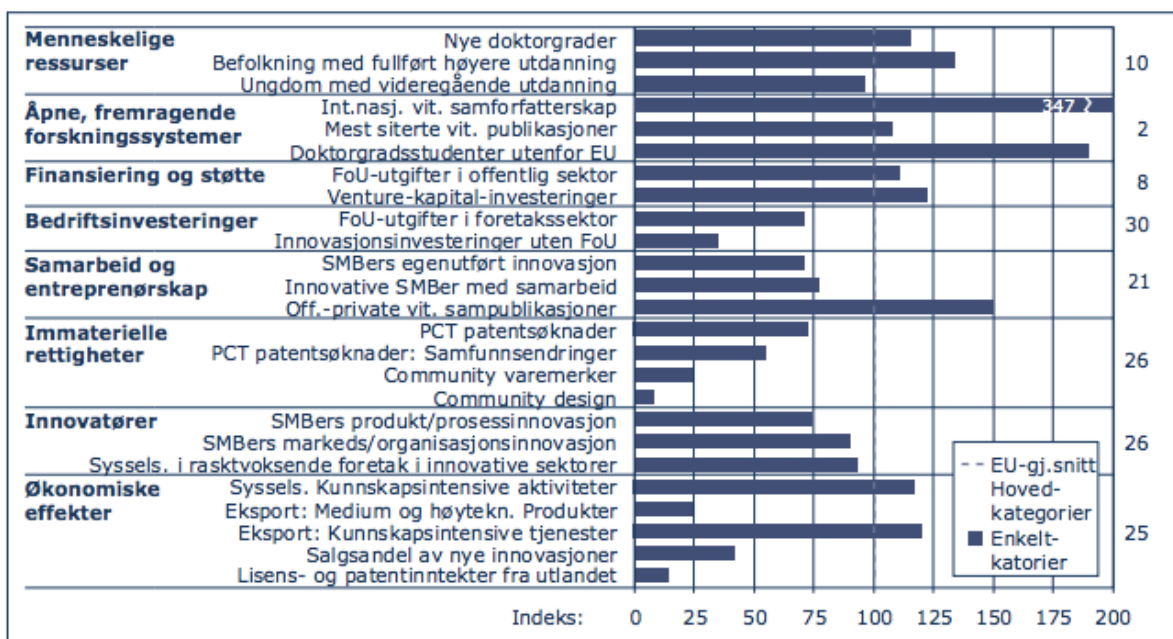


figure 2: R&D-investments in the EU and Scandinavia

The graph above presents the growth in R&D-investments in the EU and the Scandinavian countries between 2005 and 2015. The green line which represents Norway indicates clearly that there was a powerful and continuous growth that started in 2013 (Frank, Berrios, & Fondevik, 2017).

Norway emerges as one of the leading countries in terms of outreaching the research systems. For the past few years, Norway has been ranked as the second biggest research investor in Europe, right after Switzerland. Norway’s very high proportion of co-publications with foreign researchers is particularly important for this success (Aksnes D. , et al., 2015). It is

also connected with the fact that Norway needs to cooperate with foreign researchers because it is still a small R&D nation, despite the strong growth. However, Norway is above the average on highly-cited articles and inbound researcher mobility. Additionally, Norway scores high on indicators for education, public R&D-investments and access to venture capital, but is ranked very low on other indicators, especially regarding intangible rights and export of high technology. Firstly, it is mainly due the fact that Norwegian industrial structure is based on high value in raw material industries. Secondly, the measures are in relation to GDP, which means that Norway's high GDP level pulls the results down, which is partly the case for patents, trademarks and designs. Thirdly, Norwegian enterprises consistently reported little innovation in the regular innovation surveys compared to other European countries (Aksnes W. , et al., 2016).



Kilde: EU-kommisjonen/EIS 2016

figure 3: Community Innovation Survey – CIS

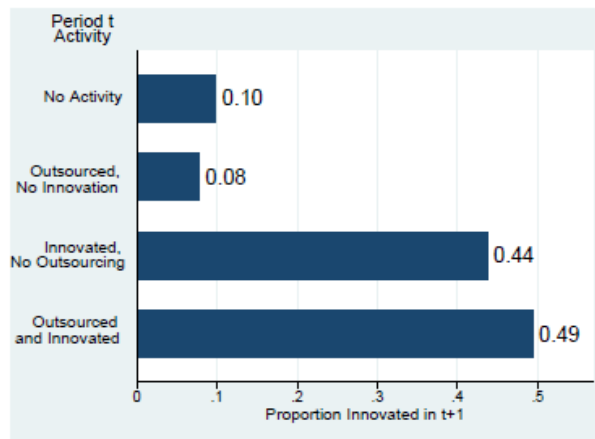
The graph above shows the indexes related to innovation and R&D in Norway. From top to bottom: human resource, research systems, financing, investing, co-operation, intellectual property, innovators and economic effects (Aksnes W. , et al., 2016).

## 2.3 Outsourcing

Outsourcing is the procedure of acquiring external contractors/specialists to perform specific functions, that would have been otherwise performed by the firm itself. Although such procedure was well-known in the business world for centuries, the direct concept of «outsourcing» itself was introduced in the early 1980's (Greaver, 1999). According to Greaver (1999) a firm can save time and resources by handing out tasks to outside specialists, thus allowing the firm to redirect its focus to areas of interest, such as innovation.

Alternatively, a firm can also outsource their entire innovation function to the outside specialist, especially in cases where they lack the competency and/or the experience to thrive in that area. Outsourcing can also supply the firm with new knowledge and technology that have not been possessed by the firm to date, and this can give a good head start in terms of innovation development (Gobble, 2013);(Greaver, 1999). Both foreign and domestic contract agreements is applicable in outsourcing, but the concept distinguishes from moving facilities such as in offshoring/nearshoring. Offshoring is re-localization of own facilities to distant countries, and nearshoring is re-localization of own facilities to neighbouring countries. In other words, offshoring/nearshoring doesn't necessarily involve outsourcing since the process can occur without seeking third-party contractors to do the job (Rilla & Squicciarini, 2011).

Bakthiari & Breunig (2013) conducted an empirical study on the relationship between outsourcing and innovation on a firm-level. The study was done on Australian firms that were divided in four categories on whether they outsourced or not, and if innovation was the goal they wanted to achieve.



*figure 4: Proportion innovated vs. time (Bakhtiari & Breunig, 2013)*

Their study suggested that outsourcing without an emphasize on innovation was cost reducing, but made the firm weak against capturing future opportunities. This group had an estimated innovation probability of only 8 percent. Innovation oriented outsourcing led to higher costs, but the degree of innovativeness was a lot higher with 49 percent probability of being effectively innovative. Additionally, a contribution to R&D was also highlighted as a critical factor to enhance a firm’s innovation capability (Bakhtiari & Breunig, 2013).

R&D and its relationship with outsourcing is researched by Noya & Canal (2015) amongst 170 high-tech companies across Europe and US. Their findings suggested that outsourcing R&D activities contributed to innovation. Outsourcing R&D involves that the responsibility for e.g. competency development is entrusted to external providers, considering that the provider is a specialist in that certain area (Noya & Canal, 2015). Specialists can either be used to efficiently exploit a firm’s technological ability, or to simply provide the required knowledge from the outside. From the R&D perspective, the ability to quickly acquire and dispose technological knowledge can become a critical factor to gain innovative advantages. Research has shown that this feature is especially handy in situations where there is an acute need of knowledge, something that is very common for firms operating in temporary niches

(Calderini & Scellato, 2005). Fully integrating a knowledge that is only required for a short-term can lead to excessive use of resources. Outsourcing makes firms much more flexible as firms can dispose the specialists when they are no longer needed, thus saving valuable resources for e.g. further innovative purposes (Noya & Canal, 2015). Additionally, external contributions have been shown to be innovation-enhancing as long as tacit-knowledge and sensitive information weren't made available to the outsiders. According to Noya & Canal (2015), such resources should be kept internally, and if outsourcing could possess a risk of plagiarism, other strategies should be preferred instead.

Based on the article *smartsourcing* by Koulopoulos & Tom Roloff (2006), a well-implemented outsourcing strategy always begins with intense self-examination. The logic behind outsourcing is that you perform activities you are good at, and “buy” those you aren't good at from others who are. In the big picture, this allows firms that outsource to focus fully on strengthening their core competencies, rather than using resources on activities that they are weaker on comparatively with the external providers. If a firm knows what they are capable of from the very core, they will be more likely to take the right outsourcing decision (Koulopoulos & Roloff, 2006); (Rasheed & Matthew, 2000).

### **2.3.1 Insourcing**

Insourcing is the process of allocating and/or reallocating resources internally within the firm (Schneiderjans & Schneiderjans, 2005). In situations where firms primarily seek to increase control over internal competency and development, insourcing is often viewed as the right approach (Schneiderjans & Schneiderjans, 2005). In order to properly execute insourcing of innovation-related activities, a firm should create internal innovation-networks to reach out to



every necessary employee. These internal networks collectivise employees by promoting team-work and exchange of knowledge, which can boost a firm's innovation-capability (Mark E. Atikins, 2016). Insourcing can also involve hiring the external providers, such as a transition from outsourcing to insourcing. The focus on a firm's core through an inside-out perspective can contribute to strengthen the R&D function, and a strong R&D function have a significant role on influencing a firm's own innovative potential (Mujamdar, 2014).

Strategies such as vertical- and horizontal integration can also be associated with the term insourcing. A macro-economic study done by Acemoglu et al. (2003) compared vertical integration and outsourcing, where vertical integration was viewed as a type of insourcing. Models from this study suggest that vertical integration helped to increase the control over business activities, in comparison to outsourcing. This increase of control can protect a firm's valuable resources and promote competency development in the long term (Aghion, Zilibotti, & Acemoglu, 2003). Such attributes can be associated with innovation as a firm becomes more autonomous, thus bringing more uniqueness and novelty to their desired product of innovation (Schneiderjans & Schneiderjans, 2005). The authors are therefore viewing insourcing as the optimal sourcing method for developing sustainable attributes. Through vertical integration, Acemoglu et al. (2003) argues for an improved overall firm stability with healthier employee relationship. Another important benefit of this strategy is that firms avoid sharing profits with the contractors/providers, that would have otherwise occurred in outsourcing (Aghion, Zilibotti, & Acemoglu, 2003). Financial savings is a valuable resource for firms as it can be invested in further innovation development (Schneiderjans & Schneiderjans, 2005).

### **2.3.2 Economic Effects of Outsourcing**

The literature focuses plenteously on the implications of economic savings regarding investments, risks and regular expenses associated with outsourcing. According to Kakabadse (2000), savings in these areas can considerably strengthen a firms overall financial performance. Service providers, as in outsourcing, that run large-scale operations in a specific area of expertise is generally more eligible to develop new technologies. This way, firms who outsource can develop a new technology by using less resources than usual, and this can give firms access to expertise that wouldn't have been financially possible beforehand.

TCE, Transaction Cost Economics, also play a significant role when a firm is facing the decision to outsource or not. TCE is the theory of accounting for the governance structure and actual costs of outsourcing business functions. This can be broken down into various costs such as transaction costs, contracting costs. coordination costs, and research costs. These costs can influence a firm's decision of "making" versus "buying", and is therefore something important to consider before a decision is taken (Williamson, 2008). Transaction costs are dependent on the characteristics of each transaction: uncertainty, transaction frequency and asset specificity. The degree of each characteristic can determine the presumed transactional costs that are associated with outsourcing. According Won's (2015) study of TCE's influence on outsourcing-decisions, outsourcing may be more preferably when the perceived subjective uncertainty is high, but outsourcing should be avoided if the perceived subjective uncertainty is low. However, if a firm is in a transaction specific relationship, the degree of opportunism will increase and lead to more subjective uncertainty. Therefore, the requirement of flexibility is lower and outsourcing wouldn't necessary be the optimal approach to consider (Won, 2015).

## 2.4 Summary of Theories

Innovation is essential for firms to succeed in a competitive environment, and Norwegian firms are no exception from this. A firm's investment in R&D play a major role on innovation, and this investment is highly influenced by the decision to either outsource this function, or to keep it internally. According to recent statistics, the total amount of Norwegian R&D investments are increasingly growing, and more and more firms collaborate with research-institutes and universities/colleges alike. Collaborations are becoming more usual as firms want to achieve more innovation for every penny invested in R&D. This challenge has often led firms to experiment with various strategies such as outsourcing the R&D function to specialists that can perform the task better than the firm itself. (Frank, Berrios, & Fondevik, 2017); (Fitjar & Pose, 2011); (Aksnes D. , et al., 2015).

Keeping R&D internally, or outsourcing it to specialists, can bring various consequences to a firm's innovative capability. For instance, obtaining innovation without outsourcing can be viewed as a better long-term approach as firms can become more independent and able to develop its own sustainable expertise. The inside-out perspective is shown to shift a firm's focus to their own unique core-competencies, without exposing them to outside contributions. This can promote heterogeneity in the desired product of innovation, and can protect valuable resources such as tacit-knowledge. To put in shortly, if a firm has subjective and objective heterogeneous resources, intern focus on R&D is often the optimal approach to obtain a more secure innovation development. (Schneiderjans & Schneiderjans, 2005); (Mark E. Atikins, 2016); (Mujamdar, 2014); (Aghion, Zilibotti, & Acemoglu, 2003).

Outsourcing on the other hand is viewed to be more attractable when there is little threat to the heterogeneity of a firm's products and services. A firm can achieve new attributes to develop innovation by outsourcing R&D functions to outside specialists. Outsourcing can also give firms access to gain knowledge and competence from the outside by allowing specialists to perform innovation-enhancing tasks. Additionally, various economic factors and TCE can also influence the decision to outsource or not. Therefore, it is very important to notice how these factors are connected, and how they can lead to different outcomes in the bigger picture. (Bakhtiari & Breunig, 2013); (Greaver, 1999); (Noya & Canal, 2015); (Rasheed & Matthew, 2000); (Koulopoulos & Roloff, 2006).

Despite plenteous theoretical-and empirical evidences available, there are still some uncertainties left within the science of R&D, outsourcing and innovation. Through this chapter, we have gained insight on various implications of outsourcing R&D, but we know very little regarding the criteria behind firms' decision to outsource this function. There's a lack of subjective values based on firms' perspectives and experiences with this approach, and we believe that a deeper study in this area will in further contribute to the science behind this phenomenon. Additionally, there are also uncertainties regarding the factors that can support or constrain a firm's goal of enhanced innovation. The literatures we have in our hands is too vague to highlight this issue, and requires further examination. In order to illuminate these gaps, we have conducted a qualitative study amongst Norwegian R&D firms who had experiences with R&D outsourcing and innovation development.

## **3 METHODOLOGY**

---

The purpose of this chapter is to present our choice of methodology and process for our research. Firstly, we will introduce what a research design is, and justify our choice of research design by explaining why we believe it is the most appropriate for this case.

Afterwards, we will introduce the data-collection method we have chosen, why we have chosen that method, and how we are going to implement it. In the end of this chapter, we will give an evaluation of our methodological approach, and discuss reliability and validity of the study.

### **3.1 Research Design**

The aim of this research is to explore and go deeper in to the subjects, therefore, an explorative study design is a good approach to consider. Explorative studies are often most suitable when there's little knowledge about a field, and when the goal is to create an insight and understanding of the problem (Thagaard, 2009).

This type of study design initiates with a literature research to expose existing materials about the current subjects, and to take consideration on how researchers have gathered data to examine questions within the same framework. After collecting and analyzing available literatures, a reasonable thing to do thereafter would be to create a plan to fill in possible “gaps” that have been revealed (Thagaard, 2009); (Jacobsen, 2011). The purpose of this method is trailed towards a specific goal. This involves how one can collect information from various sources, and how this information should be analyzed. Also, a methodology study

helps to examine if the assumptions are correlated with the reality, and to take critical conclusions based on the results of the research. In the next chapter, we will discuss this further.

### **3.1.1 Choice of research design**

In this section, we will explain our choice of research design for this thesis. A design of a study should always reflect the research problem (Thagaard, 2009). The scientific methodology can be divided in to two main approaches in data collection: qualitative and quantitative. A quantitative research design is aimed to gather and present objective values such as numbers, tables, charts, and similar, based on data-collection from huge quantity of respondents or responses. Although there isn't a defined maximum or minimum number of participants to categorize a research as quantitative, typical characteristic of this method will usually include numerical values, a strict set of questions, and less room for receiving unique and open answers from the respondents. A qualitative research is more exploratory approach compared to the quantitative. It is primarily used to raise an understanding of underlying reasons, opinions, and motivations behind phenomena to be researched upon. It offers a textual explanation that provides a descriptive view of the actuality. This kind of text can describe people's actions, statements, intentions and perspectives regarding the specific phenomenon.

The research design we have selected is based on our agenda and research topic. Our focus in this thesis is to examine Norwegian R&D firms' experiences with R&D outsourcing and innovation-stimulating strategies. The qualitative research design will give us the proper insight and depth we are looking for to contribute to this area. Although the concepts R&D,

outsourcing and innovation are very popular and have ground in many reliable studies, the relationship between these concepts lack direct contributions such as in-depth information and inputs from firms that have high association with the subject. Literature we have examined in the previous chapters of this thesis presents theories and researches related to our research area. These theories and the researches are complementary, but as we mentioned, there are need for more supplementation to cover up the missing links. In order to give a precise answer to our research questions, we believe that a qualitative study is a necessity. On the other side, we haven't found any quantitative studies that have examined the exact same research area either. However, a quantitative approach wouldn't satisfy our agenda as we are not after numerical values nor a comparison of a similar research. The flexibility of a qualitative study will allow us to collect data directly from the viewpoint of the R&D firms and provide us with rich and imperative information. We believe that these factors combined, will give us the data we seek, and make us able to contribute to a faintly researched area.

### **3.1.2 Case study**

Yin (1981) defined a case study as "*an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-world context*" (Yin, 1981, p. 13). The principal of the study is the case itself. Therefore, the aim is not to generalize the understanding, but to show how it can contribute to develop the theory. A case study design should be considered when the focus of the study is to answer questions like "how" and "why" without manipulating the behavior of those who participate in the study (Yin, 2014). This method should be considered when the goal is to uncover contextual conditions that have relevance to the phenomenon that is to be researched.

One of the most common advantages of the qualitative method is that it allows the informants to come with new inputs which can come as an addition to the researcher's agenda (Yin, 2014). A second known advantage in an interview process is the opportunity to adjust the questions based on the current situation. Silverman (2004) argues that this advantage also makes it possible to get access to valuable information which is difficult to get from other study methods.

A weakness with this study design is that you can sometimes get too much or irrelevant information, thus making the data quite challenging to analyze and categorize. Too much or too vague responses that have emerged during the interview can turn a qualitative process into a complicated bowl of information that is almost impossible to explicate. To avoid this undesired consequence, it could be beneficial to create a structured or a semi-structured interview, where the informants get the same range of questions. A good structure will prevent or at least reduce the risk of getting in very complex situations. Another weakness of the qualitative approach in our example is the retrospectivity of our study. A retrospective study takes account of a previously experienced phenomenon that is not occurring at the exact moment of the interview/data-collection (Polit & Beck, 2004). The downside with this is due to the basic human nature and difficulties to remember the details and conditions of the phenomenon. This could lead to the informants giving an unprecise information based on what they thought happened, rather than what actually happened (Yin, 2014). This retrospectivity can be seen in conjunction with some of our informants. Although we prioritized informants who had previous experience from outsourcing R&D and innovation development, it turned out that several of these informants also had current experiences as well with ongoing projects. This brought actuality into their information, and reduced some of the downsides associated with the retrospectivity of our study.



## 3.2 Selection of Informants

The selection of informants was based on strategic assortments with qualitative studies, as we need to focus on those who are the most appropriate for our study. It is important that the researcher specifies the characteristics of the chosen group to highlight their significance to the study (Thagaard, 2009). Since the selection of the right informants is critical within the qualitative approach, we had to carefully evaluate our decisions in this area. To secure informants with good knowledge about R&D outsourcing and innovation, we focused our selection scope on acknowledged R&D firms. A researcher in a qualitative study would rather go deeper than wider to examine a phenomenon. The focus on representability and generalization of the selection is less important in qualitative studies, than in quantitative ones (Thagaard, 2009). Furthermore, in a qualitative study, it is usually more challenging to gather individuals that are willing to elect as informants compared with a quantitative research. This is because qualitative studies go deeper and might require more sensitive information which the informant wouldn't want to share (Thagaard, 2009).

Initially, we contacted “Innovasjons Loftet” in Kongsberg to receive guidelines and help to find the right informants to our case. They recommended a well-known R&D firm as a potential informant and a contact person at Innovation Norway who could help us further. Innovation Norway is one of the most important governmental organizations in Norway for innovation and development of Norwegian enterprises and industries. We received a positive response and useful tips about what we should do next. They recommended us a leading R&D firm in Norway and to The Research Council of Norway (Forskningsrådet). Forskningsrådets Skattefunn presented a list of approved R&D firms in Norway based on their expertise and reliance. We contacted all the firms they marked as certified for their contributions in R&D,

and had ongoing or recent experiences. Leading positions would give us much more reliable and richer information, so we prioritized them as informants. We sent e-mails directly to the CEO of the firm, or the leader of the R&D departments. In some cases, we had to reach them through the switchboard, especially when the contact information wasn't specified. In addition to the list found at Skattefunn, we contacted few other firms acknowledged in Norway as R&D specialists.

In total, we sent out 37 e-mails to R&D firms and firms associated with outsourcing of such functions. We sent out the e-mails between mid-February and March 2017. Most of the firms responded negatively to our request due to reasons as lack of experience, change of strategies, and to other reasons like lack of time and interest in the topic. This is an expected outcome in interview requests, and it is therefore important to get in touch with as many potential informants as possible. Five firms responded positively to our request, and we proceeded to set a time/date and agreed on the interview method with each informant. For those who hadn't responded until mid-March, we had to call directly to their office to check the status. Some firms requested a re-send of the e-mail, and some firms declined their participation shortly after. We managed to get additional two informants to participate after this process. Although the numbers were quite marginal in comparison to the total number of informants we tried to reach out too, we were sure that seven good informants could give us the information we needed in order to answer our research questions. As a bonus, all seven firms were approved by The Research Council of Norway (Skattefunn) as R&D firms, with various outsourcing experiences. They also possessed different firm characteristics such as size, branch and specialization, which we assumed would be very beneficial for comparisons.

### 3.3 Methods for collecting of data

There are numerous ways to collect data in the qualitative research method. Typically for qualitative research is to form the data with words in a complementary text format.

Collection of information occurs through finding relevant data based on the research area (Miles & Saldaña, 2013). Yin (2014) describes three types of data collection techniques. They are (1) interviews, (2) documents and archive data, and (3) observations. The interview process makes up the foundation for our case as it will help us to get our hands on relevant and new information, that wouldn't be accessible other ways. To supplement the information from the interviews, we will also refer to relevant documents to cover theoretical formulations. These documents are based on previously published, existing documents, in the form of reports, books and articles. The last data collection technique about observation will be quite irrelevant for our case study. There's simply no need to observe how firms handle R&D outsourcing over a longer period.

An interview gives a basis of information about an informant's experience, thoughts and feelings. This type of data-collection method is mostly used in a qualitative researches (Thagaard, 2009). The information can be collected individually or in a group level. We have chosen to collect the information based on an individual level. There are three ways to collect the information; (1) a small structured interview, (2) a comparative structured interview, (3) a semi-structured interview (Thagaard, 2009). The interview style should be chosen based on how free or how strict the conversation an interviewer wants. If the interviewer requires a strict interview, the themes can become so intricate that they must be clarified in advance (Tjora, 2012). A comparative structured interview will suit our case study. The themes will be told in advance to allow the informant to prepare, and to assure a free flow of the conversation. This way, we can ensure that we are staying relevant to our agenda, in addition

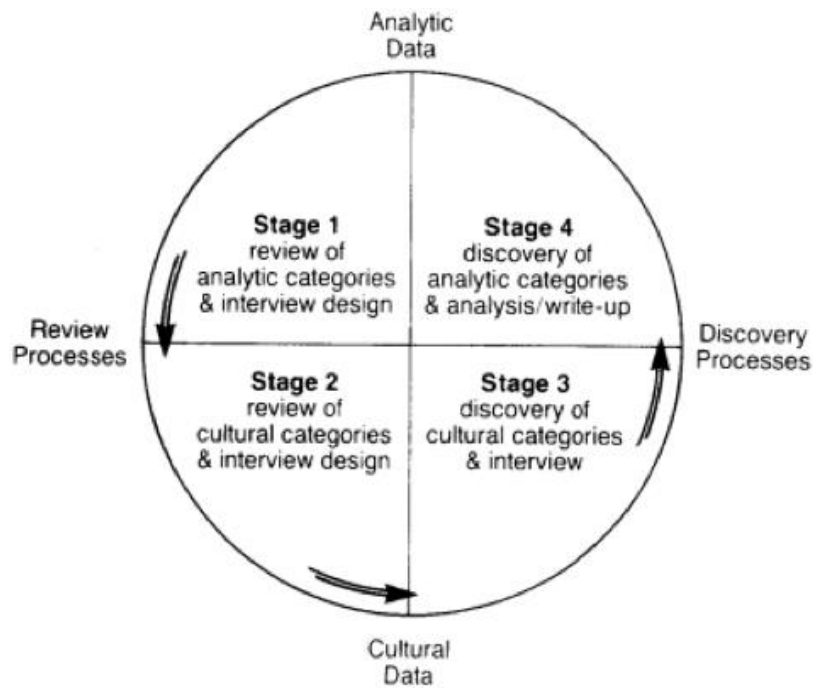
to preserving the flexibility of the interview.

## **3.4 Interview guide**

We have followed an interview guide to get most of the interviews as much as we could. The main purpose for the interview guide is to ensure that our research area is covered, keep a consistent flow throughout the interview, and to keep distance from the assumptions we had in advance (McCracken, 1988). An interview guide helps us to fully focus on what the informant says. We have used McCracken's four-step method to plan our interview process and the preparation of the interview guide.

### **3.4.1 McCracken's four-step method for examinations**

McCracken (1988) developed a four-step method can be divided in two directions. The horizontal axis divides the analytical and cultural data, and the vertical divides the examination and detection processes. All together, the axes divide the qualitative circle into four squares.



*figure 5: McCracken's four-step model (McCracken, 1988)*

Step one is about examination of analytical categories and interview design. Basically, a qualitative interview starts with a complementary examination of literature. The main point in this step is to examine the relevance of previous contributions and ensure that we are able to cover weaknesses in existing theories. Our research question and interview guide was made through an intensive literature search about R&D, outsourcing and innovation. Our interview guide included questions that brought forth opinions and assumptions the firm leaders/managers had about the topics in our research area. This made it easier for us to analyze the concepts with the literature we had found in advance. A literature research was a necessity in our case to develop an interview guide that could cover relevant topics within our research area.

The next step is focusing on examination of cultural categories and interview design. In this stage, we will eliminate and modify the questions in our interview guide based on our findings. There are numerous researches and conventions about our subject, therefore we

needed to keep a distance to what we were working with, to be able to understand it.

Following this, we needed to neutralize what we were researching for and avoid influencing the informants with our own personal opinions. McCracken (1988) argues that just knowing your own assumptions about a phenomenon, can influence the assumptions of the informants. If we are open for an earlier opinion, it doesn't have to be a drawback since it gives us the ability to change these assumptions.

The third step is about the interview procedure and the discovery of cultural categories. In this stage, we move from the review process to the detection process. Here, we need to formalize and finalize the questions and complete the interview. We need to focus on these important procedures in this point:

- 1) Let the informants tell their story in their own words.
- 2) Properly select the informants to include those who have experience and knowledge needed to provide valuable information.

The central point is to formulate questions as generally as possible. To allow the informant to get prepared, McCracken recommends to start the interview with biographical questions. In our case, we used this preparation opportunity to introduce our self and present our problem area. For the perception of the interview guide, we had to make a choice about how we should lead the conversation with the informants. The advantage of a structured approach is that the answers are comparable, because the interviews provide information within the same framework, but from different viewpoints (Thagaard, 2009); (McCracken, 1988). We decided therefore to make a structured interview in which questions are written down and the order of questions are given.

We have planned different categories with different questions in our interview, and are open for unforeseen comments that our informants should come with. The interview guide is designed on McCracken's theory and contains the following parts: an introduction, an introducing question that presents the firm, position and previous experience, research questions, and at the end allowing the informant to speak free around the subject if there is something he/she feels we have omitted.

Step four is about the discovery of analytic categories. An interview should be recorded on an audio recorder or a video recorder if it is necessary. This must be done with informant's permission. This will come as an addition to the notes that we are taking during the interview. This also the only way we can transcribe the interview correctly and makes it easier for us to take notes about the informant's observations and body language. After each interview, we have transcribed the information on the basis recommendation of McCracken. It is important to write down directly as the informants answer the questions and not a summary with their interpretations. This step is important to complete in right way, because it will be an important part of the coding process.

### **3.5 Coding and transcribing**

The information we have gathered from the participants must be coded and transcribed to conduct a proper analysis. In contradiction to a quantitative study, tests based on numerical values such as correlation, significant, deviation, and similar, aren't as usual in qualitative studies. This is due to the different agenda and purpose each approach has, but also to the lack of objective and strongly measurable numbers. To be able to analyze data from the interviews more thoroughly, transcribing is considered as a necessity. One of the most common methods

to transcribe qualitative data is by voice-recording that captures the entire interview with high clarity. Assuring good quality of the recordings will reduce the risk to source of error, and help the researchers spare time to retrieve the information (Kvale & Brinkmann, 2015). A well-used procedure in qualitative studies is to analyze based on the transcribed text from recordings. Although it is recommended to record interviews entirely, transcribing doesn't necessarily have to include every single word the informant have said. The transcribing process can be both partial and fully comprehensive. The researcher must be able to categorize the information thoroughly in order to choose the right approach. It is crucial not to exclude any data that could have some potential to be important in the analyze. It also important not to include too much data to preserve its consistency and relevance to the research area. According to Kvale & Brinkmann (2015), the amount of required transcribing is dependent on the nature of the information, the purpose of the research, and the degree of detail and precision the researcher wants to have.

In our case, we believe that a partial transcribing was the most optimal approach. The interviews provided a wide range of information as we had a semi-structured approach. We had a specific agenda, but allowed the informants to provide additional information. Sometimes, the interviews would drift away into other areas that aren't highly associated with our research question, and this could reduce the relevance of the data. In that manner, we excluded the introduction, personal information, and additional small-talks that weren't relevant. This helps to preserve the anonymity of the participants, in addition to strengthening the consistency of the data. We didn't transcribe every detail in each answer either. Repetition of information, misunderstanding of the questions, our words, firm-specific and sensitive information, and other unnecessary information were also excluded. In other words, we have filtered out all irrelevant information from the interviews so that we sat left with the usable



and necessary data to conduct analyzes from. We reduced some of the data, but we preserved the detail and precision to the fullest.

The data we transcribed from the audio recordings were thereafter coded with the software Nvivo. In order to execute the coding process, we needed to define key words to categorize the data. After defining the key words, we marked the transcribed text with color-codes based on how many times they had been mentioned. These are called nodes, and functions as a textual coding method with an inductive profile (Tjora, 2012). The nodes highlight the emphasis the informants had on each key word, thus giving us a deeper insight in the information we received from the interviews. We created nodes based on the main key-words: outsourcing, R&D and innovation, and additional nodes under each and one of them by breaking down the key-words into synonyms and other concepts we could relate them with. In total, we ended up with twenty nodes. The nodes were very beneficial to categorize and analyze the data we had transcribed. It also made it easier to compare each informant and spot key differences which would be worth to mention. The nodes have made it easier for us to present our findings to the reader in a more comprehensible matter.

### **3.6 Reliability**

Reliability is defined as the degree of consistency within the category of the researched phenomenon (Hammersley, 1992, p. 67). Reliability refers to how trustworthy the study is based on the data material. This includes how the data is collected, how it is processed, and which parts of the data that are actually used in the study itself. It can be quite challenging to secure high reliability in qualitative studies since the researcher is a part of the study itself and can influence the informant(s) directly. It is therefore a critical factor to be able to

differentiate between the information that have been gathered during the interview and the researcher's own interpretation. Additionally, it is also necessary to give the reader an insight of the methodology that have been used in the research process (Thagaard, 2009). Description of the research-process can eliminate or reduce any "doubt" in the reader.

To secure our study's reliability, we recorded the interviews with a secure device and saved it for further use to double-check the information we had gathered. One of us focused on recording the interview and taking notes, while the other one was leading the interview process by asking the questions we had made prior to the interview. Also, us working together through the interview processes, have improved the reliability even more since the study involved more than one researcher's viewpoint.

### **3.7 Validity**

Validity refers to a study's legitimacy in the context of the findings and whether they are connected to the study's purpose or not. The validity of a study can be strengthened by presenting the research process clearly, and explaining the choices that are made in terms of data collection and theoretical inputs, so that the reader can understand the purpose and the process of the study in detail (Tjora, 2012). To categorize a qualitative study as valid, it must be trustworthy and justifiable (Johnson, 1997).

There are five types of validity according to Johnson (1997): descriptive validity, predictive validity, theoretical validity, internal validity and external validity.

*Descriptive validity* refers to how accurately and correctly different aspects like events, objects, behaviors, different settings and individuals are described. In other words, it takes

account in whether the scientist have been able to describe the context of the study in a precise and understandable manner. According to Johnson (1997), the descriptive validity can be increased by involving more than one scientist to examine a phenomenon. We conducted the interviews together, and compared our interpretations of the findings with each other after the interviews were over. This way, we made sure that we had a common compliance of the findings, thus increasing the descriptive validity of the study.

*Predictive validity* refers to how precise the informants' viewpoints, thoughts, emotions, intentions and experiences have been reported by the scientists. To accomplish this, the scientists must be able to set themselves in the viewpoint of the informants to understand exactly how they interpret the questions and the situation. Johnson recommends two strategies to improve the predictive validity in qualitative studies: Assuring a low level of interference, and allowing feedbacks from the informants. To obtain a low level of interference, we transcribed the data we received from the informants by audio recordings, and used exactly their words to analyze the findings. This way, we made sure that the informants personal words came up clear and un-refined by our assumptions. Additionally, we asked the informants to give us a feedback on the questions and to give supplementary inputs they felt was necessary to the case. We also asked the informants if they could allow us to contact them back again, just in case we would miss or be unsure about some details.

*Theoretical validity* is described by Johnson as compliance between the explanations, based on the data and the results of the research. Shortly put, the higher the theoretical explanations are correlated with the collected data, the higher the theoretical validity will be. We developed our interview-guide with base in the theoretical framework that we had uncovered. The

inclusion of various theories from various authors regarding the subject, was a strengthening factor due to the inclusion of different sources.

*Intern validity* refers to the scientist's ability to justify the cause and effect between the relationships regarding the researched phenomena. This makes internal validity only relevant in studies that try to establish casual relationships. In observational or descriptive studies, like in most qualitative studies, intern validity will have less relevance. Additionally, we haven't used other methodologies or data collection methods outside the qualitative method. In these terms, we are not able to classify our study with high intern validity, but we also think that it is irrelevant for this case.

*Extern validity* regards the generalization of the findings in the study. If the findings can be accurately transferred to other related studies, there would be a high potential of high extern validity. This is a rather difficult task to accomplish in qualitative studies due to the low number of informants. We can't justify for high extern validity in our study, but like in the previous paragraph, it is not quite the purpose either.

## 4 PRESENTATION OF FINDINGS

---

In this chapter, we have presented important findings that we have collected during the interviews. As we mentioned in the previous chapter, it is very important to submit data materials that carry high relevance to the theory and research agenda. These findings have highlighted important measures from the eyes of the informants', and will act as the underlying foundation to answer our research questions.

The first section of the interview covers a small presentation of the informants and their firms, without harming the confidentiality. After the brief introduction, we have presented a table from Nvivo, and explained how it helped us to measure the frequency of relevant terms our informants mentioned. The next chapter provides an insight of the informants' definitions of the central concepts R&D ("FoU" in Norwegian) and innovation. After that, we have presented findings regarding the informants' experiences with R&D outsourcing, and the criteria behind this decision. We have also asked the informants specifically about the relationship between innovation and R&D outsourcing to clarify the enhancing or constraining factors. To highlight the situation in Norway more thoroughly, we have presented findings about the impact of the oil crisis on R&D investments from the perspectives of our informants. Finally, we have presented findings about unconventional motives to outsource R&D, the future of R&D and additional information the informants brought forth.

## 4.1 Brief introduction of the informants

We have used fictional names for the informants and haven't mentioned the firm names to protect the confidentiality. The informants have been assured that their information wouldn't be presented in a traceable way in this thesis. Thankfully, we could include the informants' positions as it carried an importance to the quality of the research. The informants had highly relevant positions, and were able to provide valuable and actual information. We have also included some characteristics and specialties of the firms the informants worked for, E.g.: firm size, customer base, branch, experience, etc.

Name (fictional)	Position	Firm Characteristics/Specialty
Grete	R&D department leader	<ul style="list-style-type: none"> <li>- Middle-sized firm</li> <li>- Customer mix of governmental institutions and private industries</li> <li>- Conducts R&amp;D projects for others, and have also experience from outsourcing their own R&amp;D function</li> </ul>
Ankristin	R&D department leader	<ul style="list-style-type: none"> <li>- Big-sized firm</li> <li>- Large customer mix from various branches</li> <li>- Cooperative with research-intuitions and other R&amp;D firms</li> <li>- Conducts R&amp;D projects for others, and have also experience from outsourcing their own R&amp;D function</li> <li>- Experience with activities that promoted internal R&amp;D growth</li> </ul>
Fredrik	CEO	<ul style="list-style-type: none"> <li>- Small-sized firm</li> <li>- Highly specialized competence</li> <li>- Customer mix of very large and small entrepreneur firms</li> </ul>

		<ul style="list-style-type: none"> <li>- Conducts R&amp;D projects mainly in Nano-technologies in selected branches</li> </ul>
Lars	CEO	<ul style="list-style-type: none"> <li>- Small-sized firm</li> <li>- Various customer mix</li> <li>- Conducts R&amp;D projects mainly within maritime technologies, and have also experience from outsourcing their own R&amp;D function</li> <li>- Collaboration with governmental R&amp;D intuitions</li> <li>- Acts as a “bridge” between research-institutions and firms, but offers plain R&amp;D services as well</li> </ul>
Torleif	Untitled (various positions within R&D)	<ul style="list-style-type: none"> <li>- Middle-sized firm</li> <li>- Long experience with R&amp;D projects for various firms and institutions</li> <li>- Various customer mix. Mostly martime and offshore</li> </ul>
Hans	R&D Manager/consulting	<ul style="list-style-type: none"> <li>- Big-sized firm</li> <li>- Acts as a “bridge” between research-institutions and customers</li> <li>- Soft-funding and consulting based projects</li> <li>- Large customer base. A mix of big and small sized firms</li> </ul>
Kristoffer	Development and Innovation manager (specialization in mechanics and IT)	<ul style="list-style-type: none"> <li>- Medium-sized firm</li> <li>- Specialization in disruptive innovation, engineering and patenting</li> <li>- Customers consisting of mostly big firms and startups</li> <li>- Unspecified segment and branch (operates in various areas)</li> <li>- Experience from developing firms’ R&amp;D functions from ground-up.</li> </ul>

The informants have various experiences from R&D outsourcing and innovation. As shown above, some firms perform R&D services for others, while some act both as a seller and a customer of R&D outsourcing. Also, some of the firms were more specialized in certain segments and branches, and operated only within set boundaries. Other firms were more flexible, and were open to anyone who desired their R&D services. Furthermore, few firms also acted as a “bridge” between Innovation Norway/ The Research Council of Norway and firms who wanted to boost their R&D-function.

## **4.2 Nvivo and categorization of the findings**

As mentioned in the methodology chapter, Nvivo is an efficient tool to measure the frequency of key-words mentioned in the interviews. We defined three main nodes: innovation, outsourcing and R&D, and included supplementary nodes to capture synonymic key-words. Each reference on a node equals one mentioning of the key-word, or mentioning of something highly associated with the key-word. By measuring the frequencies of these key-words, we have been able to get a better overview of our data. Through Nvivo, we gained insight on how much or how little various topics received attention in our research area.



Nodes			
Name	Sources	References	
Innovation		7	54
Disruptive (disruptiv)		2	2
market (marked)		2	3
Process (Prosess)		5	7
Product (produkt)		7	20
radical (radikal)		3	6
technology (teknologi)		7	31
Outsourcing		7	37
Conctracting (Kontrakteri)		3	4
Cooperation (samarbeid)		7	19
Financial (finansiell)		7	17
Insourcing		3	5
resources (ressurser)		7	25
Supplier (leverandør)		5	8
R&D (FuO)		7	43
Basic-research (grunnfor)		3	5
Competency (kompetans)		7	28
Core (kjerne)		7	23
Function (funksjon)		7	15
Oil-crisis (oljekrisen)		7	10

*figure 6; Nodes from Nvivo (see the appendix for a more comprehensive version)*

The table above presents the nodes we have used in our Nvivo analyze, how many sources these nodes were mentioned from, and how many total references they received. As we expected, the main concepts: innovation, outsourcing and R&D received the most amount of references. This is very usual since these are quite comprehensive concepts that can be associated with other underlying concepts as well. The numerical-values from Nvivo aren't meant to answer our research questions in any way. It is not intended for the reader to assume possible conclusions based on these values either. The motive behind the presentation of this table is mainly to give the reader an insight on how we mapped the information we received, and how we measured the frequency of the terms.

The following subchapters presents the voices of our informants with the help of citations and statements. The subchapters have been categorized in order to capture different areas of our findings, and to give an in-depth and rich interpretation of the informants' words. Firstly, we have introduced findings from the informants' definitions of the main concepts. This is then followed by presentation of findings on the various areas of our research area, such as the benefits/downsides of outsourcing R&D, its implications on innovation, the situation in Norway, and other additional topics that fit into this subject.

### **4.3 Informants' definition of R&D and Innovation**

The definitions of the concepts R&D and innovation among the informants carried both differences and similarities. It is interesting to compare these definitions as they can say a lot about the perception of the informants, and different perceptions can have different outcomes for our conclusion. For instance, an informant can rely on a definition of R&D which differentiates from the theory, and can be used for a different term that isn't correlated with our area of examination.

#### **4.3.1 R&D definition**

Grete defined R&D as a "blank concept" that can be about competency in small details from developing materials and/or developing complete systems that can be tested in laboratories. Grete also mentioned that her definition of R&D changed gradually throughout the years, and referred to her background as a doctoral researcher to be the cause of this change. She did also expect the general definition of R&D to change over time through new contributions to the science of R&D.

Ankristin defined the concept as: “*A task or a project with a scientific partnership and external funding*”. She emphasized external contributions as a key factor to promote R&D within a firm, and underlined the importance of cooperation and team-work to go through this process efficiently.

Unlike the other informants, Fredrik didn’t specify a concrete definition that he or his firm followed, and mentioned that he simply goes with the general view of the concept without getting too specific.

Lars defined R&D as “applied research” and method development that shatters barriers for applications. According to him, the first step of a successful R&D project begins with becoming an early bird in terms of using new tools and methods.

Torleif mentioned a similar definition of R&D as above, and highlighted modification and/or making use of an existing product/process. He characterized R&D investments as a type of “face-lift” to modernize firms and institutions alike.

Hans didn’t specify a different definition to R&D than those we have presented above, but he did mention that a firm’s core is very dependent on R&D and vice versa.

Kristoffer included terms like disruptive innovation, modernization, and operational engineering to define R&D. He did also mention that R&D in his branch is often steered with known solutions to known problems, and that it is often too standardized. He mentioned his firm’s disruptive approach brought a uniqueness to their R&D solutions.

Overall, the informants shared very similar definitions of R&D. Some statements did emphasize different various factors more thoroughly, but generally, we see that the description we introduced in our thesis comprehends several of these same elements.

### **4.3.2 Innovation definition**

Grete defined two varieties of innovation. It could either be the creation of something “new” or a continuation of research results for further commercial applications.

Ankristin said that development and innovation is often viewed as the same thing, and that it could be a challenge to differentiate these two from a managerial-perspective. She said that they emphasized the degree of novelty and the involvement of previously unthought solutions as criteria to separate innovation from development.

Fredrik’s definition of innovation included “new-thinking”, doing something that has never been done before, improvement of an old process by using new materials, etc., and/or composition of different materials to present a new final product.

Lars defined innovation as a change and/or a development of something that already exists, and the ability to adapt to changes in the market. This definition is quite different than those we have mentioned above as it doesn’t highlight the creation of the “new”, but rather improvement/development of something that already exists. This definition was also highly integrated in Lars’ firm, and is quite relatable to their products and services.

Torleif's definition of innovation was quite similarly with his definition of R&D, and was described with novelty, modification and improvement. Additionally, he mentioned the importance of research through the entire process as a crucial factor to obtain the desired innovation. In other words, innovation cannot be achieved without proper research.

Hans informed us that his firm used the OCED's definitions on innovation, which he said was the foundation of many innovation-firms across Europe. - The OCED has four different definitions for four varieties of innovation. Product innovation is defined as: "*A good or service that is new or significantly improved...*". Process innovation is defined as: "*A new or significantly improved production or delivery method...*". Market innovation is defined as: "*A new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing*". And finally, organizational innovation is defined as: "*A new organizational method in business practices, workplace organization or external relations.*" (OECD, 2005, pp. 47-51).

Kristoffer characterized innovation as something elegant and unique, who differentiates a lot from invention to invention. A critical function for innovation is that it should be to make something very elegant and challenging, fully applicable in today's world. Kristoffer also mentioned that the concept was widely used amongst Norwegian firms although he wouldn't classify all of the accomplishments as such: "*Innovation has become a widely-used concept amongst firms for commercial reasons as it can increase their reputation, even though the delivered product or service isn't innovative based on the common definition.*"

Overall, the informants shared mostly similar definitions on innovation. Some minor differences were found on the emphasis on newness, but the main elements were included in

all of them. These definitions also go well with the definitions we have introduced in the theory chapter.

## 4.4 R&D Outsourcing and Innovation

In this section, we have presented findings about our informants' experiences with outsourcing R&D and innovation. The informants shared some similarities, and provided a lot of valuable information that is noteworthy. Their positions and experiences increased the importance of their statements about this topic.

Grete mentioned that outsourcing of R&D functions is very eligible in Norway due to increased financial support from governmental institutions and high-level of cooperation amongst firms. *“Outsourcing can provide competency, technology, and other necessities required to boost firms' innovative capabilities”*. According to Grete, R&D takes a lot of time and effort to develop, and external specialists can often be the solution.

Ankristin used good cooperation as the main drive-force behind outsourcing R&D. She said that there is a good share culture in Norway that promotes cooperation amongst firms, and this makes outsourcing a good approach to consider. *“The gain is much bigger through cooperation, rather than trying to do the task all alone”*. Furthermore, Ankristin accentuated the importance of thinking outside the box by involving external viewpoints. Outsourcing is according to her, an excellent strategy to obtain good inputs that wouldn't be easy for the firm to obtain all internally. She also recommended outsourcing due to the assumption of that the smartest people aren't working in one's own firm, thus making external help a necessity.

Fredrik suggested that outsourcing R&D is generally more time-saving, more competence enriched, less costly, and more flexibility for the firm. The flexibility comes from the fact that a firm can need a specialist only for a certain project/task. E.g., a contract can last towards a specific goal, and when this is achieved, the firm can easily get rid of the external competency that is no longer required. If this was an integrated function, it would neither be easy to develop this function from ground up, and to get rid of it when the firm doesn't need it anymore. Fredrik mentioned that outsourcing could also reduce regular expenses as R&D firm wouldn't be a direct part of the customer firm themselves. Big companies can especially benefit from outsourcing R&D according to Fredrik, as they can develop too traditional strategies that can prevent their abilities on conversion and change management. Since innovation requires flexibility and rapid conversions, outsourcing the R&D function is viewed to be an optimal approach to consider. *“Weakly planned innovation can possess a high risk of failure, but by outsourcing R&D, a firm can examine their desired innovation more deeply, and reduce associated risks”*.

Lars said that his firm doesn't operate as an ordinary R&D firms as they don't operate at core-level. Firms that seeks their contributions sets up the conditions of the framework themselves, and presents it to Lars and his team. *“We develop the R&D together, rather than fully outsourcing this function”*. Lars also suggested that firms could only receive the innovative benefits of outsourcing R&D if there's a good mix of R&D firms that offer such services, and if the firm also possess some experience themselves.

According to Torleif, outsourcing R&D can be very beneficial if the firm lacks competency, has a limited capacity, and/or manages to bring a better overall value by outsourcing rather than doing it internally. *“By outsourcing R&D, firms can adapt rapidly to digitalization and changes in the markets, quickly capture new customers, develop faster technology and*

*manage time more efficiently*". Torleif mentioned that outsourcing can give the firm new guidelines to follow, thus giving them the ability to think outside the box.

Hans had a similar approach as the previously cited informant as he emphasized knowledge, competency, timing, ineligible business-models and processes, as the main drivers behind the question on whether to outsource R&D or not. He also stated that outsourcing R&D functions can connect new clusters, which can be an effective mechanism to open the firm into new innovations.

Kristoffer said: "*An external supplier can possess a competency that is not relevant to hold on to on a regular basis. This can make it easier for the firm to look for new opportunities or to balance new decisions when the team isn't too propagated*". Additionally, Kristoffer mentioned economical motives, idea inspirations, competency development, timing issues, and business policies as the criteria behind the decision to outsource.

The informants usually shared a common view on the benefits of outsourcing R&D and what areas this affected the most. They provided a variety of guidelines and key-words to look for in order to conduct an efficient outsourcing process. Predominantly, outsourcing R&D is recommended if a firm lacks the required competency, experience, financial ability, and flexibility to adapt to rapid changes. One of the firms mentioned that they didn't operate at core level, although they delivered R&D services. This is quite interesting as we thought R&D function only operated at core-level. These findings have been examined in comparison with the theories in the final chapter.



#### 4.4.1 Disadvantages of Outsourcing R&D

As possible downsides of outsourcing R&D, Grete pointed at confidentiality, sensitivity and budget issues related to the product of innovation. *“Sharing ideas with outsiders can bring a risk of plagiarism in the picture, so it depends a lot on the product of innovation the firm seeks to develop”*. The budget can also be quite tricky to pre-define as there could be a lot of hidden costs throughout the project. The firms often require a precise budget from the R&D provider, and they believe that this is easy to accomplish since they sometimes don't know the challenges that lies underneath. *“Bad customer relationship can diminish the degree of cooperation, and make the outsourcing process less effective”*. According to Grete, the customers' expectations and requirements of budget-limits were often critical factors to determine whether they should go in for a project or not.

Ankristin said that the disadvantages are dependent on the resources which the firm possesses. She used big leading firms like Google, IBM and Microsoft as examples for firms that don't outsource as much as they used to do. Over time, firms like these built their internal competencies to be more independent and sustainable. However, avoiding outsourcing completely shouldn't be the right approach either as firms cannot easily possess every necessary resource and competency internally. According to Ankristin, in cases where firms are in the process of applying for patents, they should keep the cards close to their chests before they involve external providers, in order to protect the confidentiality.

Fredrik didn't recommend outsourcing R&D over a long period of time, as it can prevent the firm from developing their core-functions. *“Take a restaurant who only serves prepared meals as an example; the chef will remain incompetent over time as he or she won't learn*

*how to cook*". To generate the most value of outsourcing, a firm should always balance the internal and the external contributions.

Lars put a lot of weight on core-competency and heterogeneity as the main factors to examine before choosing to outsource. If one or two of these are to be negatively affected, outsourcing R&D should be avoided, or at least balanced properly to avoid pitfalls. He recommends outsourcing parts of a project to specialists, rather than outsourcing the entire project itself. A firm must be able to know how much of the competency they need to possess internally in order to achieve their long-term goals. If the requirements are unknown, then the risks are higher to operate in blind-zones and taking chances with external providers. Similarly to the recommendation from Ankristin, Lars also recommended to "keep the cards close to the chest" to protect the confidentiality in the desired product of innovation.

Torleif couldn't be very specific regarding the downsides of outsourcing R&D as he viewed it as a necessity to obtain innovation. *"I can't give specific reasons on why outsourcing R&D could bring negative consequences, but as any other strategy, it should be used when suitable and in the right way"*.

Hans linked R&D directly to the firm's core, and underscored the importance of keeping it in constant development. *"A firm shouldn't make outsourcing of the R&D function a long-durational strategy. Over time, the firm could lose the grip on their core competency as they have relied too much on external providers"*. According to Hans, too much outsourcing of R&D could also diminish a firm's internal creativity and their ability to be innovative. *"As a firm outsources R&D, they must also work on their internal R&D-development to secure a sustainable growth"*.

Kristoffer covered a similar area: “*Being highly dependent on an external provider can risk the firm’s own internal development, and in some circumstances, outsourcing can require lot of resources as the projects can become very complex*”. According to Kristoffer, every detail regarding the outsourcing process must be available and understandable for each party. This could initiate higher project costs as well as transaction costs related to opportunistic behavior from each party.

The informants share very similar opinions regarding the possible downsides of outsourcing R&D. The most mentioned downsides were: weakening of the internal development, becoming overly dependent on the outsourcer, and hidden costs throughout the project. Interestingly, the relevance of transaction costs economics was also mentioned by one of the informants. These are areas we have touched theoretically, and will discuss them in further in the next chapter.

## **4.5 The Situation in Norway**

In order to examine the R&D situation in Norway, we have asked the informants some specific questions regarding the strong growth of R&D activities amongst Norwegian firms. We got insight in some unique perks Norwegian firms can access to, which could be one of the reasons why R&D grows so rapidly. We have also asked the informants about the oil crisis, and how it affected the degree of R&D outsourcing. This was quite interesting to examine since the R&D investment charts for Norwegian firms had a massive uprising approximately when the oil crisis exposed its overwhelming consequences for the country’s economy.

Grete's opinion on why R&D investments are growing in Norway is linked to the support firms can receive through Innovation Norway, Forskingsrådet, and other similar organizations. She did however feel that the economic support that comes from these organizations, aren't usually enough to conduct big innovation related projects. From her perspective, the Norwegian government is generally using less money on R&D activities compared to other European countries. She experienced that the financial support from governmental organizations didn't cover the costs fully, and that they needed to search for other possible alternatives to overcome the financial challenges. She also said that her firm had to change a lot of their business strategies due to the oil crisis although they had made a lot of preparations before-hand. Her firm had many customers from the oil-and gas industry, and many of their services lost their value due to closure of various departments. However, her firm managed to adapt to the changes, and did eventually receive a small outsourcing boost from customers within the oil- and gas industry who were looking for alternative markets.

Ankristin stated the high level of cooperation amongst Norwegian firms as the biggest success factor in innovation development. *"We see that firms, even within the same branch, cooperate behind the curtains to develop innovation of common interest"*. According to Ankristin, the sharing culture was at an all-time high in Norway after the recent oil crisis which forced firms to develop open platforms to help each other out. Regarding the oil crisis, she said that R&D investments alone weren't enough to re-strengthen the Norwegian economy. *"Our firm's ambitious strategy helped us to overcome the consequences of the oil crisis as we managed to move our expertise into other branches that weren't affected"*. In other words, high flexibility was a crucial survival factor for their firm and other R&D firms alike.

Fredrik suggested that cooperative clusters and various partnership networks benefited the Norwegian R&D growth significantly. Although he assumed that Norwegian firms were generally behind their European counterparts in terms of innovation engagement, he still felt that the government invested plentifully on innovation. After the oil crisis, his firm lost various projects and had to adjust their pricings due to the increased competition amongst R&D firms. *“We lost very important contracts after the oil crisis, but during the past two years, we managed to adapt into alternative branches where we could continue to deliver our expertise”*.

Lars stated that even competitive firms can have some degree of cooperation in Norway in terms of innovation development. *“High cooperativity is a well-known characteristic amongst Norwegian firms, and we know by experience that R&D growth can occur even in tough periods like during the oil crisis”*. The oil crisis reduced the amount of contracts his firm received since they were highly dependent on the offshore industry. Therefore, he recommended that R&D firms should possess some degree of flexibility to adapt to rapid changes in the markets.

Torleif had nothing but positive comments about innovation in Norway. He compared Norway to other European countries and the US, where he pointed at low-degree of cooperation and a lot of juristic obstacles in those countries. *“In Norway, it is a common practice to accept failure, therefore firms are less scared of taking risks to invest in innovation. Additionally, we have seen that firms have cooperated both within and across branches, which is very unlikely to take place in some countries”*. Apropos the oil crisis, he said that his firm experienced severe redundancy and had to downsize, because they were highly dependent on a specific branch.

Hans didn't have specific arguments about the situation in Norway, and his firm didn't experience any impacts of the oil crisis, neither positive or negative.

Kristoffer also emphasized the degree of cooperation amongst Norwegian firms as a positive trait for innovation development. *"We have seen this in others and amongst ourselves, that long-term innovation cooperation is a common practice. We have also worked in a "disguise" as a part of the customer-firm to promote internal growth which could diminish from traditional outsourcing"*. According to Kristoffer, partnership, loyalty and common-interests are highly recognized in the Norwegian business culture. Regarding the oil crisis, he mentioned that his firm had to adjust to overcome the changes, and used the firm's broad expertise as an important feature secure their growth. All in all, he said that the oil crisis was somehow positive for the firm as they received more requests from others who wanted to outsource R&D to them.

In summary, cooperation, sharing-culture and common goals have been highlighted by the informants as the main reasons on why the focus on R&D is growing in Norway. The oil crisis impacted the informants' firms variously, but flexibility has been shown to play a crucial factor in this area. Firms who couldn't adapt to changes and/or were highly specialized in a specific branch/area, experienced the biggest consequences of the crisis. This is going to our list of topics to discuss in the next chapter.

## 4.6 Future of R&D, and other motives for outsourcing R&D

R&D outsourcing could have other motives outside sheer innovation development, therefore, we felt it was necessary to ask the experts whether they recognized other reasons to outsource R&D. This was often linked with the informants' perception of R&D in the future, and we have decided to present findings from for these areas coherently.

Grete procrastinated a constantly changing R&D in the future. She expected the percentage of R&D tasks and projects would increase in line with the rise in demand. However, Grete couldn't specify any other reasons to outsource R&D that wouldn't affect innovation as she stated that these two were highly linked with one another.

Annkristin mentioned quite early in the interview that R&D should be separated from the concept innovation. *"R&D investments doesn't need to have innovation as the main goal of achievement. A firm can obtain new business-models, products, and similar by outsourcing, that doesn't necessarily have to be defined as innovation"*. Regarding the future of R&D, she foresaw that it's importance will be greater as time develops. She wouldn't expect the degree of outsourcing to diminish in close future either as there would always be some firms who wouldn't have the ability or the capacity to sustain only on internal R&D. *"Every business who has ambitions to survive on the long-term needs to have a proactive approach towards outside contributions"*.

Fredrik foresaw an expansion in environmental strategies in the future. *"The uprising trend of environmentalism will be implemented in most R&D projects, especially in Norway"*. He also expected R&D challenges to be even greater as time develops, and expected the sharing

economy as a potential solution to overcome upcoming difficulties. Regarding other motives for outsourcing R&D, he used examples as quality assurance, brand reputation, and other similar perks that doesn't need to be associated with innovation.

Lars suggested cost-related factors as non-innovative motives behind outsourcing R&D, but didn't see other possibilities other than that. He also hoped for an uprising in financial help from governmental institutions regarding innovation projects. *“Limited financial support has often been the reason behind many project-failures as they simply weren't sustainable to continue on with low amount of resources.*

Torleif mentioned variable costs and cost savings as possible motives to outsource R&D without necessarily involving innovation. Regarding the future of R&D, he expected R&D to become more difficult to manage in the future as technology becomes more complex, and because projects will most likely involve more actors. He is also expecting the cooperativeness amongst Norwegian firms to be affected as the projects would involve many more implications to consider, but these weren't defined very specifically by him.

Hans also pointed towards economic motives to outsource R&D rather than keeping the function fully internally. It could also be due to lack of necessary tools, resources and time, that doesn't necessarily correlate with innovation. His procrastination of the future of R&D involved a lot more ground-research and increased value chain.

Kristoffer couldn't specify any other motives behind outsourcing R&D, but he expected the future of R&D would be in the favor of specialists. *“I think that the market is going in our direction... In Norway, where conversion is a big thing, the need for specialists will always be*



*there and in fact even greater in the future*". In other words, R&D firms that specialize in one specific technology or competency, could have the upper hand in the future.

According to several of our informants, possible motives to outsource R&D apart from innovation, are often related to financial issues. The futuristic perspective on R&D is generally positive, with assumptions of its growth and necessity. It is also expected that the need for specialists will become greater in pace with the increasing complexity of technology in products and services.

## 5 DISCUSSIONS

---

In this chapter, we will merge empirical evidence with the theory to look for casualties between them. In order to answer the research questions, we have linked our findings from the previous chapter with the theory that we have presented earlier on in this thesis. The categorization of this chapter is more narrowed compared to the previous chapter so that we can highlight the research questions more thoroughly. Our effort in this chapter will be the determining factor to provide a precise conclusion that satisfies our agenda. High validity provides a strong foundation for our conclusions. Therefore, we will initiate this chapter by discussing the interviews' validity. In the next section, we will move into the research questions and discuss theoretical- and empirical evidences regarding these. Finally, we will discuss additional findings about interesting topics that we have uncovered in our research.

### 5.1 Discussion of the Interview's Validity

The Interview guide was not sent in advance to the informants because didn't have specific ideas of their knowledge about outsourcing of R&D. We stated in our information mail that we wanted to get in touch with central representatives who had expertise from various R&D services, and could give us trusted information about outsourcing of this function and its implications on innovation. The mails were sent to firms and to contact persons that we assumed to have the required experience and knowledge to answer our questions. We sat left with valuable informants that had experience from outsourcing R&D, internal R&D development, innovation projects, and other similar areas.

After the introductory questions, we asked the informants on how they would define the concepts R&D and innovation. We had the opportunity to interview informants from central positions and with various specializations related to R&D. Naturally, we assumed their definitions to vary slightly from one another, but we expected them to share the similar core-essence of the concepts. We introduced definitions for these concepts earlier in this thesis from very reliable references. However, we weren't expecting the informants to repeat these same definitions verbatim. What we interested ourselves in was to look after very coarse differences. If the informants would share a definition which we couldn't familiarize with the ones that we had used, we would have to reevaluate the data's validity. Some of the informants emphasized various factors in their definition, but they were usually linked to their specializations within R&D. Primarily, the informants' definition of the concepts R&D and innovation comprehends the main elements of the definitions we based our research questions on. Although it showed out that the informants' definitions didn't possess a threat to the interview's validity, their specializations and positions could have some. As we briefly introduced in the informant-chart in the previous chapter, the informants have different positions and come from different R&D firms. To avoid extraneous digression, we asked the informants to tell their experiences and opinions from a non-firm specific point of view. Noticeably, there was a high correlation between the informants' definitions and their expressions about R&D and innovation. The informants wouldn't touch very sensitive information regarding their business-activities either, so the answers we received were usually very neutral and informative.

## **5.2 Discussion related to theory**

In this sub-chapter, we will discuss theoretical and practical implications in correlation with our findings. We have connected empirical evidence with theories regarding our research questions, and have come across many interesting discoveries during this discussion. Some findings were highly associated with theoretical evidence, but some were quite contradictory. In addition to this, some relevant findings were surprisingly un-mentioned in previous literature. Unexpected findings can in addition to boosting our thesis' contributions, can also open up for new interesting areas to research in the future as well.

### **5.2.1 Criteria to outsource R&D**

The informants shared some similar criteria regarding the decision to outsource R&D. One of the most emphasized reasons to choose this approach was associated with a firm's available competency, knowledge, experience and tools. As we have mentioned earlier, the R&D function is highly integrated in a firm's core, and a firm has usually two ways to choose from in terms of developing this function. They can either outsource non-core functions to outside providers, and use the saved-up resources on further development of the R&D function, or they can outsource the R&D entirely or partially to outsiders (Greaver, 1999);(Gobble, 2013). Our informants possessed knowledge about both approaches, and gave some pinpoints on when one of them could be more appropriate than the other. All the informants shared a common opinion on when outsourcing R&D should be viewed as the optimal approach: lack of competency and the ability to singlehandedly improve/develop the R&D function. Based on their statements, these areas shaped the foundation of criteria linked to the decision of outsourcing R&D.

An important criterion behind the decision to outsource R&D was the flexibility that came with the required competency and skills to accomplish R&D associated goals. Amongst our informants, Fredrik suggested this more specifically by giving an example on how this flexibility could become a critical factor to successfully implement a R&D process: E.g. a firm needs to enhance their R&D functions, but have very short amount of time and/or limited resources to do this on their own, therefore they outsource this function to a provider within an arranged time- and resource limit. A benefit of this is first and foremost the improved flexibility that firms can potentially gain. Based on their suggestions, outsourcing can provide the requirements needed to develop and improve the R&D function faster than performing this process internally. Through outsourcing, firms can access the fundamental requirements needed to reach their goal more easily, and often more securely. This is also mentioned in the theoretical contributions of Calderini & Scellato (2005), who stated that outsourcing R&D is particularly handy in situations where there is an acute need of knowledge, which is often the case when firms are operating in temporary niches. Lars, Kristoffer, Grete and Fredrik had mentioned quick adaptability and specialized competency as determinant factors to outsource R&D. We recognize the importance of specialists from the contributions of Noya & Canal (2015). Based on their article, outsourcing of R&D has shown to be a critical factor for innovation development, considering that the provider is a specialist in that specific area of interest. Both Noya & Canal's and the informants' suggestions shared the similar reason for why this might be the case: quick and efficient acquirement of knowledge and expertise. Both theoretical and empirical evidence support the decision criteria associated with flexibility and specialist competency.

Additional benefits of the flexibility from outsourcing R&D is the easiness of disposing the knowledge that is no longer required (Noya & Canal, 2015). If the specialized competency is only temporarily required, the firm can easily get rid of the “extras”, thus saving valuable resources in the long-run. Amongst our informants, Fredrik suggested this as an especially important criterion regarding the decision to outsource. From his experience, this advantage was considerably common in situations where firms had short-term ambitions in new market niches, or for various experimental reasons. According to all our informants, the oil crisis in Norway did indeed encourage firms affected by it to try to enter new markets and segmentations. We believe that this could be one of the reasons on why R&D investments had such a significant growth in Norway since 2013 (Frank, Berrios, & Fondevik, 2017). Some of our informants had experienced major impacts of the oil crisis, and initiated R&D outsourcing as a solution to enter new markets themselves, or help other firms to accomplish the same. Based on their statements, this had reduced the fear of taking risks and experimenting with new business ideas, and made outsourcing an essential part of R&D improvement. Furthermore, the spared resources from quick disposal of functions that are no longer needed, can be used in future R&D investments or in other similar areas. As previously mentioned, these savings can strengthen a firms overall financial position and enhance long-term sustainability within the R&D function (Kakabadse & Kakabadse, 2000). The benefits of flexibility, specialization and resource-savings are backed with theoretical evidence as important criteria to outsource R&D.

#### **5.2.1.1. Challenges of Outsourcing R&D**

Fredrik: *“Take a restaurant who only serves prepared meals as an example; the chef will remain incompetent over time as he or she won’t learn how to cook”*. Besides the benefits and various factors that leads to the decision to outsource R&D, the informants also provided us

with some guidelines to stray away from potential pitfalls of outsourcing this function. A common suggestion from the informants is that too much focus on the outside-in perspective, can make firms forget about their own internal development. To capture the benefits of outsourced R&D, firms must be able to balance their core functions with the external contributions. This suggestion is also supported by theoretical contributions from Stanko et al. (2009) and Won (2015), who stated that too much dependence on outsourcing can inhibit a firm's ability to acquire knowledge and experience related to the issue they are trying to resolve. Moreover, outsourcing processes can sometimes become too complex to accomplish due to bad collaboration between the provider and the firm. Such mishaps can lead to more time consumption and excessive use of valuable resources, that can eventually lead to devastating consequences on the R&D function (Han & Bae, 2013). According to our informants Grete, Kristoffer and Lars, the contents of an outsourcing process must be deeply understood by both sides. They recommended tight communication, observation and cooperation as determining factors to successfully initiate R&D outsourcing. If the parties would fail to meet these conditions, then outsourcing would less likely be the optimal approach to develop this function.

### **5.2.2 Factors that support enhanced innovation**

Through our research, we have gained theoretical and empirical indications on factors that can enhance innovation. Since our informants had plenty of experience from innovation activities and outsourcing in Norway, especially during the period of intense growth in overall R&D investments, they could provide us with important factors to reflect upon.

The first factor that enhances innovation is mentioned by all of our informants, and that is cooperation. Cooperation for innovative purposes between competing firms, contractors, governmental institutions, and similar, was commonly seen in Norway. Our informants pointed out this sharing-culture as a critical factor to obtain sustainable innovation. Based on their experiences, they couldn't recognize this culture in other European countries, at least not as intense as it can be observed amongst Norwegian firms. They also assumed this to be one of the reasons behind the strong growth in R&D investments in Norway, which is currently the strongest in Europe (Frank, Berrios, & Fondevik, 2017). *“High cooperativity is a well-known characteristic of Norwegian firms, and we know by experience that R&D growth can occur even in tough periods like during the oil crisis”* – Lars. Similarly, according to Ankristin, the sharing-culture in Norway was at an all-time high after the oil crisis, and led to the creation of open platforms where firms, even within the same branch, could work together to develop an innovation of common interest. The sharing-culture has also been mentioned as an innovation boosting attribute in a previous study amongst Norwegian firms (Fitjar & Pose, 2011). The study, which we mentioned in chapter two, suggested that the likelihood of total product innovation was 35 percent higher for Norwegian firms who cooperated with science- and technology institutes. Several of our informants mentioned that they cooperated with Norwegian Governmental institutions and universities like NTNU to develop new innovations. Innovation Norway (Innovasjon Norge) and The Research Council of Norway (Forskningsrådet) didn't only act as financial supporters, but also as partners throughout innovation related projects. According to our informants, this encouraged exchange of ideas and knowledge across both parties, and served as an innovation enhancing factor. For unexperienced firms, these institutions could also provide instructional help to overcome common challenges associated with innovation.



Ankristin suggested internal innovation-networks as an innovation enhancing factor, especially when a firm is becoming too dependent on outsourcing. As we mentioned in the previous subchapter, the focus on external provisions can sometimes leave firms underdeveloped. By creating innovation-networks within a firm, employees across various departments can contribute with ideas and competencies that can significantly bring innovative advantages. Ankristin said that this helped her a lot as a R&D manager since it allowed her to discover new features that could serve innovative purposes. The contributions often came from unexpected sources within the firm which she said was quite surprising, yet highly constructive. We have recognized Ankristin's suggestion in the theoretical contribution from Schniederjan & Schniederjan (2005). The authors stated that firms with ambitions to become innovative, should develop an internal innovation-network to reach out to all employees, thus promoting more team-work and exchange of knowledge, which are essential factors to enhance innovation (Schneiderjans & Schneiderjans, 2005).

From a general point of view, Torleif suggested that it was a common practice in Norwegian business culture to accept failure, and therefore managers and employees alike, were usually less scared of taking chances. According to Torleif and other informants, the likeliness of taking risks had increased because the oil crisis pushed firms affected by it to search intensely for alternative markets to thrive in. Therefore, it was quite usual to see a traditional offshore company take risks to adapt to a completely different market for survival purposes. As we mentioned in the previous subchapter, R&D outsourcing can become a firm's key to enter a new market. Schumpeter defined market innovation as "*the opening of a new market, ... which the particular manufacturer .... hasn't entered*" (Schumpeter, 1934, p. 66). How firms adapt to new segments and customer groups, are both considered as forms of market innovation (Mowery, Nelson, & Fagerberg, 2005). Specialized knowledge from R&D

outsourcing can provide a firm with the required necessities to adapt to a new market, or even change one. Fredrik experienced that firms who moved from one market to another sometimes gained unique advantages due the distinctiveness of their products and services. This could serve as a market innovating purpose as new players could influence the market with their unanticipated features.

### **5.2.3 Factors that constrain enhanced innovation**

As we have previously mentioned in this chapter, outsourcing R&D doesn't come without perils, and some of these can constrain the development of innovation. The first factor we want to discuss is over-outsourcing the R&D function. Theoretical evidence suggests that too much outsourcing can leave a firm incompetent and unable to innovate products or processes on their own (Han & Bae, 2013); (Greaver, 1999). This is also backed by several of our informants who recommended firms not to down-prioritize internal development in the favor of outsourcing. Both empirical and theoretical evidence supports that too much reliance on outsourcing can indeed constrain the enhancement of innovation.

Another major factor that apparently constrains innovation development is financial barriers. Lack of resources and weak financial capacity can naturally be the preventer of further innovation investments. However, even a poor firm can innovate in Norway thanks to the governmental innovation institutions such as Innovation Norway (Innovasjon Norge) and The Research Council of Norway (Forskningsrådet). If firms can capture their interest, these institutions can contribute with some financial support to obtain the desired innovation. Some of our informants experienced that this financial support was often too low to consider as an innovation-enhancing factor. We have excluded specific information about the amount they

received to protect the confidentiality, and because the amounts varied a lot from situation to situation. However, our informants told us that the support wasn't usually enough to sustain the enhancement of innovation over time. Alternatively, some of them searched for financial stability via the bourse and by merging together with other firms. Limitation of resources for innovation development is also mentioned as a determinant factor according to Kakabadse & Kakabadse (2000), as firms can become hindered from proceeding towards their innovative ambitions. Transaction cost economics also play a role within financial obstacles as it can become an issue during outsourcing processes. According to Kristoffer, outsourcing can often lead to increased opportunism, especially if there's a high risk of uncertainty involved. This could go either way, as both parties can use each other's uncertainties to push the costs further, thus creating a budget-oriented conflict. He recommended both parties to investigate and understand each other to reduce the opportunism, and to create a balanced transaction that served them fairly. Theoretical evidence also suggests that outsourcing might probably not be the optimal approach to consider if the firm is in a transaction specific relationship (Won, 2015).

According to our informants, bad communication between parties can also be a factor that constrains innovation. Both parties need to understand the requirements and the details of the innovation they are trying to develop, and if they fail to do so, the process might become overly-complex and hardly feasible. The theory also advises that the parties must get to know each other thoroughly before initiating an outsourcing process (Gobble, 2013).

## 5.2.4 Other findings

Separate from the research questions, we have discovered additional findings through this research. In the literature, R&D outsourcing is always associated with innovation, but some of our informants suggested that there could be other motives to outsource R&D that didn't necessarily touch innovation. Ankristin said that R&D outsourcing could promote new business models, products and similar, that doesn't necessarily have to be innovative. The other informants pointed towards primarily economic reasons to outsource R&D, without any obligatory correlation with innovation.

The informants did also have a lot to say about the oil crisis and how it affected R&D outsourcing. Although we didn't specify this in the accumulation of our research questions, we had an assumption of the main-driver behind the rapid growth of the R&D investments in Norway, namely the recent oil crisis. According to data from SSB, the growth in R&D investments increased significantly from 2013 (Frank, Berrios, & Fondevik, 2017), which was approximately when the Norwegian economy received significant consequences of the crisis. Although we couldn't underpin a significant correlation between R&D and the oil crisis, some of our informants told us that they used it for their advantage to help other firms affected by it to change their strategies to invest in alternative markets. This is in our opinion quite interesting as we have managed to collect some hints on why R&D investments have grown so much, so quickly. The contributions of Innovation Norway (Innovasjon Norge) and The Research Council of Norway (Forskningrådet) can presumably play a role here as well, but nonetheless, this could be an interesting area to examine further.

When we asked the informants about how they foresaw R&D trends in the future, their predictions were generally positive about its increasing growth. R&D is viewed to serve a

greater function in the future, and might require more focus than it receives today. According to Kristoffer and Torleif, the specialists will become the dominators of future R&D, as they expected the technological-complexity to be even greater. Hans predicted that there would be an increase in value-chains, and more emphasize on basic-research in the future. Generally speaking, our informants had high expectations for R&D in the days to come.

# 6 CONCLUSION

The research questions in our thesis are as following:

- *What criteria underpinned firms' decision to outsource R&D?*
- *What factors support or constrain firms from meeting their goal of enhanced innovation*

Initially, we had gained insight about the potential consequences of outsourcing R&D from the literature. The literature was however too vague and non-explicit regarding the criteria of choosing this strategy, and the factors that could enhance or constrain innovation. We saw this as an opportunity to base our research questions on, and used a qualitative study to capture the information we needed in order to answer them. Our informants provided us with very rich and valuable information that allowed us to contribute to the science of R&D management.

The figure below presents the criteria that leads to R&D outsourcing, and the factors that enhance/constrain the goal towards innovation:

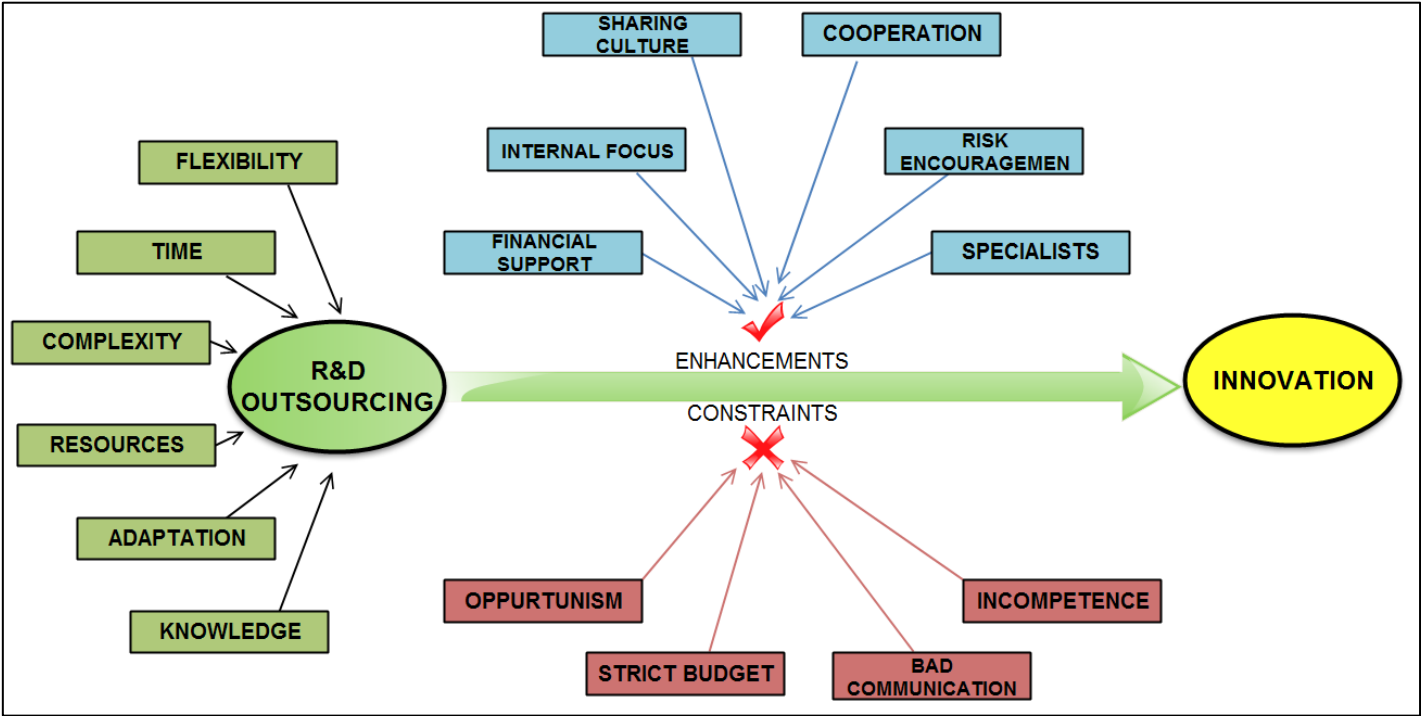


figure 7: From R&D-Outsourcing to Innovation

Based on theoretical and empirical evidence, the criteria behind the decision to outsource R&D were primarily based on a firm's competency, resources and flexibility (time and adaptation). Overall, firms who outsourced R&D, gained better advantages in terms of innovation development. The informants also emphasized the importance of hiring specialists to strengthen a firm's R&D function, rather than attempting to initiate the whole process internally. Through outsourcing, a firm can receive more inputs and contributions, all with less spent resources compared to a conventional strategy. Although the informants recommend R&D outsourcing on a general basis, they did also warn about some potential pitfalls of this approach. In fact, too much outsourcing can inhibit a firm's ability to acquire knowledge and experience related to the issue they are trying to resolve. Such consequences could lead to excessive time-consumption and use of resources, that could eventually cause the outsourcing process to fail. The informants suggested intense collaborations between the parties to be able to understand each other's requirements and demands.

Regarding the second research question, the informants and the literature suggested internal innovation-networks, sharing culture, financial support, encouragement of risk-taking, and cooperation between both sides as innovation enhancing factors. According to our informants, the business culture in Norway was very eligible for R&D investments, and could potentially be the explanatory reason behind the rapid Norwegian R&D growth. Governmental institutions promoted more cooperation and less fear of failing projects due to increased financial support. The factors that constrained innovation was over-outsourcing the R&D function, down-prioritizing internal development, financial barriers, opportunism (TCE) and bad communication between the parties. According to our findings, these constraints can make innovation projects become overly-complex and hardly achievable.

In addition to our research questions, we did also discover some interesting findings such as non-innovative motives behind R&D outsourcing: E.g.: business models, cost savings and development of non-innovative products and services. This was quite interesting as we didn't expect there were other motives to outsource R&D that wasn't associated with innovation. Additionally, the informants had highly optimistic predictions on the importance of R&D in the future, and expected the market for outsourcing to be even greater. Regarding the recent oil crisis, we have also found some hints on its correlation with the growth of Norwegian R&D-investments.

Through our thesis, we believe that we have managed to strengthen the literature with new contributions, and we hope that our findings will be useful for firms that participated in our study, and for anyone else who is interested in this subject.

## **6.1 Limitations**

Our qualitative data was based on seven central informants with various experience, perception, and knowledge regarding R&D outsourcing and innovation. In our opinion, the informants had more than satisfactory contributions to our research questions. Their firms had been exclusively picked based on their reputations and approvals as R&D firms, and all the informants had managerial and central positions. Although we are satisfied with the number of interviews we have completed and the information we have gathered, our initial plan was to conduct at least ten interviews. Having more informants can always further strengthen the study, but might become difficult to accomplish within the given time- and resource limits. Many of the firms we initially contacted didn't have time to participate in an interview, or felt that they were irrelevant to the topic. The Research Council of Norway (Forskningsrådet)



provided list of approved R&D firms, but very few had the relevance to answer our questions. Although we informed the firms that we took confidentiality very seriously, we believe that some of them still feared that sensitive information would leak out to the publicity. To prove further that we took the informants confidentiality in a serious matter, we could have applied for an approval from the Norwegian Centre for Research Data (NSD) to increase the trustworthiness that this sensitive information would be protected. We could then attach the approval in the mails we sent out to the firms with the requests. We realized that this was a possibility after we had conducted the interviews, and didn't have enough time left to apply for this approval for further potential interviews. Although we have managed to gather sufficient information, the lack of an official approval could be viewed as a small limitation.

## **6.2 Further Research**

To follow up this thesis, a similar study could be done in another country or countries where R&D investments are increasingly growing. It could be interesting to examine if there are any differences in criteria to outsource R&D and innovation enhancing/constraining factors according to firms from other countries. Different countries could have different innovation cultures, resources, governmental support-systems, etc. which could've influence R&D and outsourcing in general. Additionally, a quantitative study could also further strengthen the research by defining and measuring objective values retrieved from participating firms. However, this could probably be a difficult task to accomplish due to the requirement of firm-sensitive contents.

Much of the previous researches we have referred to in our thesis were often biased towards large firms. This could be viewed as a weakness as one study indicates that R&D outsourcing is in fact even more common amongst smaller firms (Rese & Baier, 2011). Also, current literature is too vague to distinguish the characteristics of firms that outsource R&D. A broader research involving a bigger mix of firms could be the start-point to examine potential differences between smaller and larger firms regarding the outsourcing of R&D.

Last, but not least, it could be interesting to examine if R&D outsourcing affected each of Schumpeters (1934) five-types of innovation differently: product- and service innovation, process innovation, market innovation, incremental innovation and radical innovation. Our informants mentioned a lot about product- and market innovation, but the other known types weren't specified in detail. This could hint towards that certain types of innovation could receive more benefits from R&D outsourcing than others, thus classifying this issue for a further investigation.

## 7 Reference List

- Aghion, P., Zilibotti, F., & Acemoglu, D. (2003). *Vertical Integration and Distance to Frontier*. The European Economic Association.
- Aksnes, D., Foyn, F., Knell, M., Wilhelmsen, L., Wendt, K., Børing, P., . . . Scordato, L. (2015). *Norsk FoU og innovasjon i internasjonal kontekst*. Det Norske forskningsrådet.
- Aksnes, W., Foyn, F., Piro, F., Solberg, E., Wendt, K., & Wilhelmsen, L. (2016). *Statistikk og Indikatorer*. Det Norske Forsknings- og Innovasjonssystemet.
- Amit, R., & Zott, C. (2001). Value Creation in E-business. *Strategic Management Journal*, ss. 493-520.
- Assink, M. (2006). Inhibitors of Disruptive Innovation Capability: A conceptual model. *European Journal of Innovation Management*, pp. 215-233.
- Baer, D. (2014, Nov. 11). *The Making Of Tesla: Invention, And The Birth Of The Roadster*. Retrieved from Business Insider: <http://www.businessinsider.com/tesla-the-origin-story-2014-10?r=US&IR=T>
- Bakhtiari, S., & Breunig, R. (2013). *Outsourcing and Innovation: An empirical exploration of the dynamic relationship*. Berlin: The B.E. journal of economic analysis & policy.
- Baumol, W. J. (2002). *The free-market innovation machine. Analyzing the growth miracle of capitalism*. Princeton University Press.
- Bernstein, E. (2016). *Global R&D Funding Forecast*. Industrial Research Institute.
- Breiby, M. (2012). Innovasjon i opplevelsesbasert reiseliv. In M. Rønningen, & T. Slåtten, *Innovasjon og næringsutvikling i en reiselivskontekst* (pp. 100-119). Vigmostad & Bjørke AS.
- Butterworth, G., Westdijk, S., & Magnus, K. (2013). *Outsourcing in Europe: An in-depth review of drivers, risks and trends in the European outsourcing market*. Ernst & Young.
- Calderini, M., & Scellato, G. (2005). Academic research, technological specialization and the innovation performance in European regions: An empirical analysis in the wireless sector. *Industrial and Corporate Change*, 14, pp. 279-301.
- Chase, R., Jacobs, F., & Aquilano, N. (2004). In *Operations Management for Competitive Advantage* (pp. 372-374). Boston: Irwin/McGraw-Hill.
- Christensen, C., & Raynor, M. (2003). *The Innovator's Solution: Creating and sustaining successful growth*. Harvard Business Press.

- Corbett, M. F. (2004). *Outsourcing Revolution : Why It Makes Sense and How to Do It Right*. New York: Kaplan Publishing.
- Damanpour, F. (1991). Organizational Innovation: A Meta-Analysis of Effects of Determinants and Moderators. *The Academy of Management Journal*, pp. 555-590.
- Damanpour, F., & Aravind, D. (2011). Managerial Innovation: Conceptions, Processes and Antecedents. *Management and Organization Review*, pp. 423-454.
- Denning, S. (2013, January 21). *What went wrong at Boeing?* Retrieved from Forbes: <http://www.forbes.com/sites/stevedenning/2013/01/21/what-went-wrong-at-boeing/>
- Dodgson, G. (2008). *The Management of Technological Innovation*. Oxford University Press.
- Drucker, P. (1993). *Managing for the future*. Routledge.
- Edquist, C. (2005). Systems of Innovation: Perspectives and Challenges. *The Oxford Handbook of Innovation*. Oxford University, pp. 181-209.
- Eurostat. (2016). *MSTI Nordic R&D statistics*. OECD.
- Fagerberg, J., Mowery, D., & Verspagen, B. (2009). The evolution of Norway's national innovation system, Science and Public Policy. *Science and Public Policy vol. 36*, pp. 431-444.
- Fitjar, R. D., & Pose, A. R. (2011, July). *Firm Collaboration and modes of innovation in Norway*. Stavanger: Imdea. Working papers series.
- Fitjar, R. D., & Pose, R. A. (2013). *Interaction and Innovation across different sectors: Findings from Norwegian City Regions*. International Research Institute of Stavanger AS.
- Fitjar, R., & Rodriguez, P. A. (2012). The geographical dimension of innovation collaboration. *Networking and Innovation in Norway*, pp. 2572-2595.
- Foyn, F., Berrios, C., & Fondevik, H. (2016). *Research and development in the business enterprise sector from 2014: final figures*. SSB.
- Frank, F., Berrios, C., & Fondevik, H. (2017, Feb. 17.). *Statistisk Sentralbyrå*. Retrieved from SSB: <https://www.ssb.no/en/foun>
- Garcia, R., & Calantone, R. (2002). A critical look at technological innovation typology and innovativeness terminology: a literature review. *Journal of Product Innovation Management*, pp. 110-132.
- Gjelsvik, M. (2007). *Innovasjonsledelse - ledelse av innovasjon og internt entreprenørskap*. Fagforlaget.
- Gobble, M. M. (2013). Outsourcing Innovation. *Research- Technology Management*, pp. 64-66.

- Godin, B. (2008). *Innovation. The History of a Category*. Working Paper.
- Greaver, M. F. (1999). *Strategic Outsourcing: A Structured Approach to Outsourcing Decisions and Initiatives*. New York: AMACOM.
- Grimm, C., & Smith, K. (1997). *Strategy as action: industry rivalry and coordination*. South-Western College Publishing.
- Hammersley, M. (1992). *What's wrong with ethnography: Methodological explorations*. Routledge.
- Han, S. Y., & Bae, S. J. (2013). Internalization of R&D outsourcing. An empirical study. *International journal of production economics*, pp. 58-73.
- Harvard Business Essentials. (2003). *Managing Creativity and Innovation*. Harvard Business Press.
- Howells, J. (1999). Research and Technology outsourcing and innovation systems: an exploratory analysis. *Industry and Innovation*, pp. 111-129.
- Hsuan, J., & Mahnke, V. (2010). Outsourcing R&D: a review, model, and research agenda. *R&D management 41*. Blackwell Publishing Ltd.
- Hunt, D. P. (2003). The concept of knowledge and how to measure it. *Journal of Intellectual Capital Vol. 4*, pp. 100-113.
- Industrial Research Institute. (2016). Global R&D Funding Forecast. *R&D Magazine*, 3-35.
- Jacobsen, D. I. (2011). *Hvordan Gjennomføre Undersøkelser? - Innføring i Samfunnsvitenskapelig Metode*. Kristiansand: Høyskoleforlaget.
- Johnson, B. R. (1997). *Examining the validity structure of qualitative research*. Education.
- Kakabadse, N., & Kakabadse, A. (2000). Critical review – Outsourcing: a paradigm shift. *Journal of Management Development Vol. 19*, pp. 670-728.
- Klein, J., Gee, D., & Jones, H. (1998). Analysing clusters of skills in R&D-core competencies: Metaphors, visualization, and the role of IT. *R&D Management 28(1)*, pp. 37-42.
- Koulopoulos, T., & Roloff, T. (2006). *Smartsourcing: Driving innovation and growth through outsourcing*. Platinum Press.
- Kvale, S., & Brinkmann, S. (2015). *Det Kvalitative Forskningsintervju*. Gyldendal.
- Lankford, W. M., & Parsa, F. (1999). Outsourcing: A primer. In *Management Decision* (p. 312). MCB University Press.
- Mahnke, V. (2006). The process of vertical dis-integration: an evolutionary perspective on outsourcing. *Journal of Management and Governance*, pp. 189-207.

- Mark E. Atikins. (2016, mai 31). *Insource Innovation*. Retrieved from Innovation Management: <http://www.innovationmanagement.se/2011/11/03/insource-innovation-to-generate-better-ideas-fuel-product-pipelines/>
- McCracken, G. (1988). *The Long Interview*. Newbury Park: Sage Publication.
- Micklethwait, J., & Wooldridge, A. (2003). *The Company: A short history of a revolutionary idea*. Random house publishing group.
- Miles, M. B., & Saldaña, J. (2013). *Qualitative Data Analysis: A methods sourcebook*. Sage Publications.
- Moore, G. (2006). *Dealing with darwin: How great companies innovate at every phase of their evolution*. Capstone.
- Mowery, D., Nelson, R., & Fagerberg, J. (2005). *The Oxford Handbook of Innovation*. Oxford University Press.
- Mujamdar, A. S. (2014). Outsourcing, Insourcing, and Rightsourcing of R&D. In A. S. Mujamdar, *Drying Technology. An International Journal* (p. 1641). Taylor & Francis Group.
- Noya, A. M., & Canal, E. G. (2015, December 28). The framing of knowledge transfers to shared R&D suppliers and its impact on innovation performance: a regulatory focus perspective. *R&D Management Journal*. Vol. 46, Issue 2., pp. 354-368.
- Nærings og Handelsdepartementet. (2012). *Innovasjon på Norsk: Hvor står vi, og hvor går vi?* Nærings og Handelsdepartementet.
- OECD. (2005). Basic Definitions. In OECD, & Eurostat, *Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data* (pp. 47-51). OECD Publishing.
- OECD. (2007). *Economic Surveys: Norway*. Paris: OECD.
- OECD. (2017, 4 27). *Defining Innovation*. Retrieved from Innovation Strategy: <https://www.oecd.org/site/innovationstrategy/defininginnovation.htm>
- Onsager, I., & Johnstad, T. (2007). Technology Cities in Norway: Innovating in Global Networks. *European Planning Studies*, pp. 549-566.
- Oshri, I., & Kotlarsky, J. (2011). *Innovation in Outsourcing: A study of client expectations and commitment*. Warwick Business School.
- Polit, D. F., & Beck, C. T. (2004). *Nursing research (7th ed.)*. Philadelphia: Williams & Wilkins.
- Prahalad, C. K., & Hamel, G. (1990). The core competence of the corporation. *Harvard Business Review*, 68 (3), pp. 79-91.

- Quinn, J. B. (2000). Outsourcing Innovation: The new engine of growth. *MIT Sloan Management Review*, pp. 13-28.
- Rasheed, A., & Matthew, G. (2000, July 8). Making more by doing less: An analysis of outsourcing and its effects on firm performance. *Journal of Management*, p. 766.
- Rese, A., & Baier, D. (2011). Success factors for innovation management in networks of small and medium enterprises. *R&D Management* 41, p. (part two).
- Reve, T. (2014). *Innovasjon*. Magma - Econas Tidsskrift for Økonomi og Ledelse.
- Rilla, N., & Squicciarini, M. (2011). R&D (Re)locating and Offshore Outsourcing: A Management Perspective. *International Journal of Management Reviews*, pp. 393-413.
- Schilling, M. (2010). *Strategic Management of Technological Innovation*. Boston: McGraw Hill.
- Schillinger, D. (2010). *An introduction to effectiveness, dissemination and implementation*. Research & Community Engagement Program.
- Schneiderjans, M. J., & Schneiderjans, D. G. (2005). What Is Insourcing? In *Outsourcing and Insourcing in an International Context* (pp. 3-6). New York: M.E. Sharpe.
- Schumpeter, J. A. (1934). *The Theory of Economic Development*. Harvard University Press.
- Seddighi, H. R., & Huntley, P. J. (2007, May 15). R&D Activities In a Peripheral Region: an Empirical Study with Special Reference to the North East Region of the UK. *Economics of Innovation and new Technology*, pp. 211-225.
- Silverman, D. (2004). *Qualitative Research: Theory, Method and Practice*. Sage Publications.
- Spilling, R., Sandven, T., & Gunnes, H. (2014). Det norske forsknings- og innovasjonssystemet: Statistikk og indikatorer. In *Indikatorrapporten* (pp. 160-183). Norges Forskningsråd.
- Stanko, M. A., Bohlmann, J. D., & Calantone, R. J. (2009, July 15). *Outsourcing Innovation*. MIT Sloan Management Review.
- Subramaniam, L., & Venkatraman, N. (1999). The influence of leveraging tacit overseas knowledge for global new product development capability: an empirical examination. *Dynamic Strategies Resources Journal*, pp. 373-401.
- Thagaard, T. (2009). *Systematikk og innlevelse - En Innføring i Kvalitativ Metode*. Fagbokforlaget.
- Tidd, J., Bessant, J., & Pavitt, K. (2005). *Managing innovation: integrating technological, market and organizational change*. Wiley.
- Tjora, A. (2012). *Kvalitativ Forskningsmetoder i Praksis*. Oslo: Gyldendal Norsk Forlag AS.

- Wilhelmsen, L., & Foyn, F. (2014). *Innovasjon i Norsk Næringsliv*. SSB.
- Williamson, O. E. (2008). Outsourcing: Transaction Cost Economics and Supply Chain Management. *The Journal of Supply Chain Management*, pp. 5-16.
- Won, J. C. (2015). *Insourcing or Outsourcing: The Entrepreneurship Approach*. Academy of Entrepreneurship Journal.
- Yin, R. K. (1981). *Case Study Research*. London/New Delhi: Sage Publications.
- Yin, R. K. (2014). *Case Study Research: Design and Methods*. Sage Publications 5th ed.



## 8 APPENDIX

---

### 8.1 Interview Guide

- *Start with a brief introduction of us, our mission, and the agenda of the interview.*
- *Ask the informant if it is okay to record the interview*

**1. Can you please introduce yourself and your position?**

- a. Name
- b. Age
- c. Position
- d. Experience

**2. Can you please introduce your firm? are you/your firm working with R&D today?**

- a. Background & History
- b. Location
- c. Size/Characteristics
- d. Products and services
- e. Specialization
- f. Branch/ Customer base
- g. R&D tasks
- h. Etc.

**3. How do you define the concept of R&D(FuO)?**

- a. Firm specific, or a general definition?

**4. How do you define the concept of innovation?**

- a. Firm specific, or a general definition?

**5. What are the criteria behind a firm's decision to outsource R&D?**

- a. What factors must be in place, before outsourcing of R&D should be considered? (like the question above)
- b. What are the benefits of outsourcing R&D?
- c. What are the disadvantages of outsourcing R&D?
- d. What are the benefits of keeping R&D internally (avoiding outsourcing)?
- e. Have your firm outsourced their own R&D function?
  - i. How?
  - ii. Why?

- 6. What are the factors that support or constrain innovation according to you?**
  - a. Have your firm experienced any of these?
  - b. If yes: What are these experiences?
    - i. How did you/your firm achieve these supporting factors?
    - ii. How did you/your firm manage factors that constrained innovation?
      1. Are they inevitable? If so, why?
  - c. What are the advantages/disadvantages of Norwegian firms that pursue innovation?
  - d. Are there non-innovative motives to outsource R&D?
  
- 7. How did your firm experience the effects of the oil-crisis? Can you correlate it with the increased attention on R&D and innovation?**
  
- 8. What are your expectations of R&D's development in the future?**
  
- 9. Is there something else you wish to add to this interview, that we haven't covered already?**

## (IN NORWEGIAN)

- *Start med en kort introduksjon: hvem vi er, hva vi er ute etter, hva intervjuet vil gå ut på, etc.*
- *Spør om tillatelse for lydopptak før intervjuet påbegynner.*

### **1. Kan du fortelle oss om deg selv og din stilling?**

- a. Navn
- b. Alder
- c. Stilling/område
- d. Erfaring

### **2. Kan du fortelle oss om ditt firma?**

- a. Hvordan dere jobber med R&D
- b. Historisk bakgrunn
- c. Beliggenhet
- d. Størrelse/karakteristikker
- e. Produkter og tjenester
- f. Spesialiseringer
- g. Kundebase
- h. Etc.

### **3. Hvordan definerer du begrepet FuO/R&D?**

- a. «Generell definisjon eller eget?»

### **4. Hvordan definerer du begrepet innovasjon?**

- a. «Generell definisjon eller eget?»

### **5. Hva er kriteriene bak beslutningen om outsourcing a R&D?**

- a. Hvilke faktorer bør være på plass før en evt. outsourcingprosess vurderes?
- b. Hva er fordelene av å outsource R&D?
- c. Hva er ulempene av å outsource R&D?
  - i. Hva er fordelene av å holde R&D internt? (unngåelse av outsourcing)
- d. Har ditt firma outsourcet sin R&D?
  - i. Hvordan?
  - ii. Hvorfor?

### **6. Hvilke faktorer fremmer eller hindrer innovasjon ifølge dere?**

- a. Har ditt firma opplevd noen av disse?
  - i. Hvis ja: hva er deres erfaringer?

- ii. Hvordan oppnådde ditt firma fremmende faktorene?
- iii. Hvordan håndterte ditt firma hindringene?
  - 1. Er de uunngåelige?
    - a. Hvis ja: hvorfor?
- iv. Hva er fordelene/ulempene av Norske firmaer som driver med innovasjonsarbeid?
- v. Er det motiver bak R&D outsourcing som ikke berører innovasjon?

**7. Har dere følt noen direkte effekter av oljekrisen? Hvilket?**

**8. Hvordan tror du R&D tjenester vil forandre seg i fremtiden?**

**9. Er det noe vi ikke har berørt du mener er viktig å få frem, med tanke på vår studie?**

## 8.2 Interview Request

*Subject: Request for participation in an interview about R&D and outsourcing.*

Hi.

We are two MSc Business Students from University College of South-East Norway. We are writing a master thesis regarding outsourcing of the R&D function, and its importance for innovation development. This area has received a lot of theoretical contributions lately, but there are still some gaps left to be filled. Our aim is to contribute to the research by examining the criteria behind the decision to outsource R&D, and the factors that enhance/constrain innovation. Your firm has been approved as a R&D/FuO-provider at Forskningsrådets Skattefunn, so we would like to have an interview with a central representative to be able to answer our research questions.

Qualitative studies in Norway is especially ideal due to the fast growth of R&D-investments amongst firms and the increased need for innovation after the recent oil crisis.

An interview is intended to take approx. 45min-60. Preferably F2F, but Skype/telephone is also an alternative.

We take confidentiality very seriously and will preserve you and your firm's anonymity in our thesis. Our field-notes, audio-recordings, and similar, will be deleted after project-end in 16<sup>th</sup> of May. After the approval from our supervisor, we will share the thesis with you.

Due to the time limit, we wish to complete all interviews before the Easter-break (14<sup>th</sup> of april). We have high flexibility, and will be available to proceed the interview when it suits you the most

Your contribution will be highly appreciated.

Best regards

Anujan Puventhiran  
[Anujan11@hotmail.com](mailto:Anujan11@hotmail.com)  
Tel. Number: 917 846 11

&

Ender Tugsuz  
[Endertugsuz@hotmail.com](mailto:Endertugsuz@hotmail.com)  
Tel. Number: 413 015 82

MSc Industrial Economics - USN, Kongsberg

**(IN NORWEGIAN)**

*Emne: Forespørsel om å delta i intervju om FoU-outsourcing og innovasjonsarbeid*

Hei.

Vi er to industriell økonomi studenter fra HSN Kongsberg, som skriver en masteravhandling om outsourcing av R&D/FoU funksjonen, og dens rolle for innovasjonsutvikling. Dette området har blitt belyst i mange vitenskapelige bidrag i de siste årene, men det gjenstår allikevel noen hull i forskningen som fortjener ekstra oppmerksomhet. Vårt mål med avhandlingen er å undersøke kriteriene bak beslutningen om å outsource FoU, og faktorene som fremmer/begrenser innovasjon. Siden deres institusjon er godkjent som FoU-tilbyder hos forskningsrådet, ønsker vi å ha et intervju med en sentral representant for å kunne besvare vår problemstilling.

En kvalitativ studie i Norge er spesielt ideelt med tanke på sterk økning i FoU-innvesteringer på landsbasis og et uttrykt behov for mer innovasjons etter oljekrisen

Et intervju er beregnet til å ta mellom 45min-1t. Fortrinnsvis ansikt til ansikt, men Skype/telefon er også gode alternativer. Vi tar hensyn til konfidensialitet og funnene vil bli fremlagt anonymt i avhandlingen. Selv om vi ikke er ute etter sensitive opplysninger, vil vi allikevel slette notater, opptak og lignende etter prosjekt slutt (rundt slutten av juni). Avhandlingen vil bli delt med dere når vi får tillatelse av vår veileder.

Av tidsmessige grunner ønsker vi helst å runde av alle intervjuene før påske. Vi har ellers fleksibilitet til å kunne være tilgjengelig for intervju i det tidspunktet dere prioriterer.

Deres bidrag vil bli høyst verdsatt.

Med vennlig hilsen  
Anujan Puventhiran  
[Anujan11@hotmail.com](mailto:Anujan11@hotmail.com)  
Tel. Number: 917 846 11

&

Ender Tugsuz  
[Endertugsuz@hotmail.com](mailto:Endertugsuz@hotmail.com)  
Tel. Number: 413 015 82

Industriell økonomi - HSN, Kongsberg

## 8.3 Nvivo

Nodes							
Name	Sources	References	Created On	Created By	Modified On	Modified By	
<ul style="list-style-type: none"> <li>Innovation               <ul style="list-style-type: none"> <li>Disruptive (disruptiv)</li> <li>market (marked)</li> <li>Process (Prosess)</li> <li>Product (produkt)</li> <li>radical (radikal)</li> <li>technology (teknologi)</li> </ul> </li> </ul>		7	54	05.05.2017 01.28	USN	06.05.2017 18.55	USN
<ul style="list-style-type: none"> <li>Outsourcing               <ul style="list-style-type: none"> <li>Contracting (Kontrakteri)</li> <li>Cooperation (samarbeid)</li> <li>Financial (finansuell)</li> <li>Insourcing</li> <li>resources (ressurser)</li> <li>Supplier (leverandør)</li> </ul> </li> </ul>		7	37	05.05.2017 00.46	USN	06.05.2017 17.59	USN
<ul style="list-style-type: none"> <li>R&amp;D (FuO)               <ul style="list-style-type: none"> <li>Basic-research (grunnfor)</li> <li>Competency (kompetans)</li> <li>Core (kjerne)</li> <li>Function (funksjon)</li> <li>Oil-crisis (oljekrisen)</li> </ul> </li> </ul>		7	43	05.05.2017 00.03	USN	06.05.2017 17.59	USN
		2	2	05.05.2017 01.32	USN	05.05.2017 02.48	USN
		2	3	05.05.2017 01.31	USN	06.05.2017 18.13	USN
		5	7	05.05.2017 01.30	USN	06.05.2017 18.52	USN
		7	20	05.05.2017 01.30	USN	06.05.2017 18.13	USN
		3	6	05.05.2017 01.31	USN	06.05.2017 18.14	USN
		7	31	05.05.2017 01.28	USN	06.05.2017 17.55	USN
		3	4	05.05.2017 00.47	USN	06.05.2017 18.44	USN
		7	19	05.05.2017 01.30	USN	06.05.2017 18.01	USN
		7	17	05.05.2017 01.42	USN	06.05.2017 17.53	USN
		3	5	05.05.2017 01.33	USN	06.05.2017 17.53	USN
		7	25	05.05.2017 01.29	USN	14.05.2017 02.02	USN
		5	8	05.05.2017 00.47	USN	06.05.2017 18.02	USN
		3	5	05.05.2017 02.46	USN	06.05.2017 18.00	USN
		7	28	05.05.2017 01.29	USN	06.05.2017 18.00	USN
		7	23	05.05.2017 00.49	USN	06.05.2017 17.47	USN
		7	15	05.05.2017 00.49	USN	05.05.2017 02.54	USN
		7	10	05.05.2017 01.41	USN	06.05.2017 18.25	USN