



Risk management disclosure

An empirical study of listed Nordic oil companies

MASTER'S THESIS

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Abstract

The concept of risk management has received considerable attention following the global financial crisis in 2008, but is yet to be reflected in empirical research examining companies' risk reporting practices after this crisis. This study seeks to fill this gap in literature by exploring risk management disclosure (RMD) during the period 2007-2016. The study has chosen listed Nordic oil companies as population due to the homogeneous risk environment and reporting standards, making RMD comparable across the industry.

The empirical approach aims to quantify the characteristics of RMD in annual reports through developing an index, called Risk Management Disclosure Index (RMDI). The index is constructed based on identified 'leading practice' in RMD from existing literature and previous findings. The study examined and analysed the scores in the RMDI to investigate the development in the population throughout the analysed period and the potential value creation thereof.

This study has positive development in RMD in the population throughout 2007-2016. In addition, companies appear to disclose risk management more homogeneous in 2016 compared to 2007, although development patterns varied vastly. A negative correlation between RMD and EBIT is suggested by the results, implying that companies disclose more risk management information in times of undesirable financials to retain investor confidence. The study found a positive correlation between RMD and share price. However, findings showed no support of a positive correlation between company's RMD and EBIT. Thus, the value creation of RMD remains ambiguous in this study.

The significance of the results is, however, limited due to noteworthy shortcomings, created by the limited sample size and subjectivity of the analysis of content in the annual reports. The applicability of the RMDI method is expected to contribute to further research.

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1 Introduction

1.1 Motivation

Existing literature has previously discussed the importance of risk management and the potential value that can be created for companies (COSO, 2004; Deloitte, 2015a; Nocco, Nationwide Insurance, & Stulz, 2006). In the aftermath of the global financial crisis in 2008 and the business scandals that followed, the concept of risk management has received increased attention. In the efforts to restore investor confidence after the crisis, companies have been voluntarily disclosing risk management to increase transparency towards the stakeholders (ACCA, 2014). Additionally, previous research has discussed the topic of *risk management disclosure* (hereafter *RMD*) and the potential value creation from disclosing beyond minimum requirements (Emm, Gay, & Chen-Miao, 2007; Federation of European Accountants, 2014; Linsley & Shrides, 2000; Rajab & Schachler, 2009). Consequently, the importance of RMD has increased as a result of the financial crisis, which makes RMD the focal point of this study.

Risks are highly diverse in both nature and extent depending on the business activities, region, industry, size etc. (Linsley & Shrides, 2006). As such, it is necessary to use a homogenous population defined by similar risk exposures in order for risk management to be comparable. In recent years, the oil industry has drawn attention by the oil price collapses in 2008 and 2014 and catastrophic events including the BP Deepwater Horizon incident in 2010, resulting in increased focus on risk management and damaging hazards (Energy Digital, 2011; Rudloff & Schultz, 2016). Therefore, this study is motivated to focus on the oil industry when investigating RMD, and more specifically, how it has developed around the two oil price collapses in the period 2007-2016. Additionally, as the industry is homogenous and characterised as intensively regulated with relatively straightforward risks, value creation from RMD will be easier to identify as it leaves less room for noise from external factors (Rudloff & Schultz, 2016).

According to Lars Ragnar Vigdel, accounting expert from EY, the Nordic oil industry is fairly immature regarding risk disclosure as companies tend to benchmark against the industry and adjust their RMD according to competitors (L.R. Vigdel, personal interview, March 08, 2018). Thus, the value creation of risk management remains ambiguous, leaving room for improvement and investigation of the topic in this region.

This study aims to contribute to existing literature by applying general concepts of risk management and the incentives of RMD. As such, it will provide deeper insight to the current immature RMD practices in the Nordic oil industry. Additionally, as few scholars have devoted their attention to investigate how RMD has *developed* over recent years, the development and potential value creation from RMD during the unstable period of 2007-2016 will be examined. Thus, this study is motivated to investigate how RMD has developed in the Nordic oil industry and how it may impact the companies' values.

1.2 Research Question

This study seeks to fill a gap in the existing body of literature on the topic of risk management by answer the following research question:

How has risk management disclosure developed for listed oil companies in the Nordics during the period 2007-2016, and is risk management disclosure value adding?

1.3 Research Approach

Findings and conclusions of an academic research are impacted by the selected research approach. This section outlines the empirical approach applied for this study followed by an introduction of the research philosophy and an overview of the type of data used.

1.3.1 Empirical approach

In order to investigate the research question, there is a need to quantify the disclosed risk management, as RMD is mainly qualitative. This study reviews existing literature and previous findings to form a fundamental understanding of risk management, RMD, and the oil industry. Based on this review, hypotheses are developed in order to better answer the research question. The analysis is based on empirical data, where sample companies are analysed in order to investigate the hypotheses. For this purpose, an index has been developed to quantify companies' RMD, called *Risk Management Disclosure Index* (hereafter *RMDI*). The RMDI consists of KPIs derived from the literature review, representing what the literature suggest to be good risk management practice

(hereafter '*leading practice*'). Scores are assigned to the sample companies in the RMDI based on disclosed risk management. As such, the index forms the basis for the data on companies' RMD for the empirical analysis, will be further analysed through methodologies disclosed in chapter 5.

1.3.2 Research Philosophy

Embarking on research in a particular field will develop new knowledge. The way the research is conducted, data collected, analysed and used is termed research philosophy (Saunders, Lewis, & Thornhill, 2009). In this study, a positivistic perspective to the research philosophy has been applied, implying that the data is regarded as unambiguous and accurate, which allows the study to emphasise the empirical analysis and subsequent interpretation rather than focusing on possible biases of data. Furthermore, this study requires a subjective approach regarding the quantification of the qualitative data in RMD, which may cause biased interpretations. Possible biases are acknowledged in section 6.1.4.2.

1.3.3 Research data

The analysis in this study originate from a combination of quantitative and qualitative data that are both primary and secondary in nature. Primary data is specifically collected information for a specific study, whereas secondary data is readily available information from other sources that has already been collected for other purposes (Kumar, 2011; Saunders et al., 2009). The primary qualitative data consist of gathered data from public annual reports for the sample companies and semi-structured interviews with three experts that represent the main stakeholders for an annual report. The methodology for the interviews will be further outlined in section 6.1.3. Primary quantitative data consist of financials from the public annual reports. The secondary qualitative data comprise of data from published books, academic papers, published reports, and publications by regulatory bodies. The secondary quantitative data originates from the financial database *Thomson Reuter's Datastream* (hereafter *Datastream*) consisting of sample companies' financial data and oil prices. A walk-through of the data source used and considerations on data selection and availability can be found in section 6.1.2.

1.4 Delimitations

This section outlines the delimitations that have been necessary to undertake in order to obtain the scope of the study and be able to discuss the applicability of the findings.

1.4.1 Annual reports

According to Lam (2014), the annual report is considered as the main vehicle to disclose key information to the company's stakeholders. Therefore, this study has chosen annual reports as the basis of collecting information of the companies' RMD, as it is assumed to be accurately representative of the actual risk management. Hence, this study delimits from any interim reports such as quarterly or half-year reviews, or additional publications such as CSR reports as it is considered outside the scope due to time and resource constraint.

1.4.2 Target population

For the purpose of the research, listed companies in the Nordic oil industry is chosen as the target population by the following reasons. Firstly, the oil industry is characterised as a regulated industry with relatively straightforward risks, where companies are primarily dependent on a single common factor, namely oil. Due to previous events including highly volatile oil prices and catastrophic oil spills, risk has received increased attention in the industry (Energy Digital, 2011; Rudloff & Schultz, 2016). Recent catastrophic events have emphasised the magnitude of the consequences of improper risk management, as the oil industry is capital intensive in nature. Thus, using the oil industry as population will facilitate the identification of value creation from RMD as it leaves less room for noise from external factors. Secondly, as the population is predominantly dependent on the oil prices, it is expected that all companies are exposed to similar risks. One could therefore argue that risk management is comparable across companies, which makes value creation from risk management easier to distinguish. The reasoning for choosing the oil industry is illustrated in **Figure 1**.

Figure 1: Illustration of the reasoning of selecting the oil industry as population:



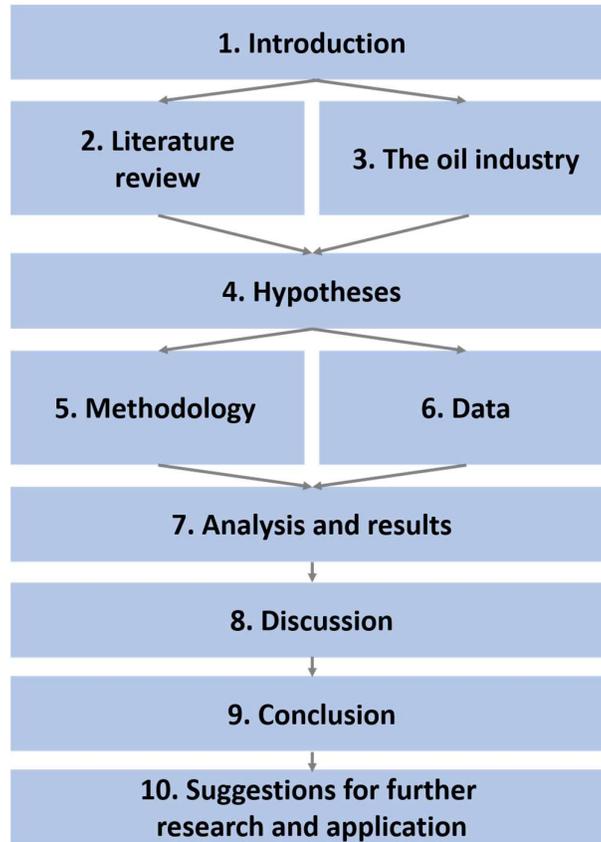
Source: Own construction

Following the choice of the oil industry, the population is further narrowed to listed companies due to the readily availability of data for public companies and similar requirements of accounting standards for the annual reports (IFRS, 2017). Lastly, the Nordic region is chosen as population due to the homogeneous reporting standards for listed companies. Thus, companies are exposed to equal disclosure requirements and the annual reports are comparable across countries (IFRS, 2017). Nevertheless, the population may have somewhat differences in characteristics, such as size, operational activities, geographic, and product portfolio, which might create some variances in risk exposure. However, this study delimits from such potential differences as the Nordic oil industry is relatively small and thus the population size is limited.

1.5 Research structure

This study follows the structure as illustrated in **Figure 2**.

Figure 2: Research structure



Source: Own construction

1. Chapter 1 comprises of an **introduction** of the motivation, research question, research approach and delimitations of the study.
2. Chapter 2 contains a **literature review** of existing literature on the concept of risk management, risk management disclosure and value creation from RMD. It will review findings from previous research to distinguish any ‘leading practice’ on RMD.
3. Chapter 3 provides a brief overview of **the oil industry**, including key characteristics, main events, industry risk exposure and risk disclosure requirements.

4. Chapter 4 presents the rationale underlying the development of the **hypotheses** that will be tested in order to answer the research question.
5. Chapter 5 outlines the **methodology** applied to carry out the study.
6. Chapter 6 outlines the **data collection** based on the frame set by the methodology and introduce the target population, sample selection and sample size.
7. Chapter 7 performs testing of the hypotheses outlined in chapter 4. The **analysis and results** will be developed through both descriptive and regression analyses.
8. Chapter 8 includes a **discussion** of the research approach applied in this study along with the findings and results from chapter 7.
9. Chapter 9 outlines the **conclusion**, summarising the most significant results from the analysis and discussion and ultimately answers the research question.
10. Chapter 10 presents **suggestions for further research and application**.

2 Literature review

This chapter reviews existing literature and findings from previous research within risk management and RMD, which have inspired the method and approach of this study.

2.1 Risk definition

A struggle in performing any research of risk disclosure is to *identify* risk, as it requires the concept of 'risk' to be explicitly defined. There is not a single one-sentence definition of risk that is absolutely satisfactory. The terminology of risk originates from the Italian *riskare*, meaning 'to dare' (Moles, 2016). The Oxford English Dictionary defines risk as a '*situation involving exposure to danger, or a person or thing regarded as likely to turn out well or badly in a particular context or respect*' (Oxford Dictionaries, 2018). The *Committee of Sponsoring Organization* (hereafter *COSO*), defines risk in the context of *Enterprise Risk Management* (hereafter *ERM*) as '*the possibility that events will occur and affect the achievement of strategy and business objectives*' (COSO, 2016, p.9.).

2.1.1 Types of risks

Companies in every industry and country across the globe are frequently reminded that they operate in a risky world (Rudloff & Schultz, 2016). Risks are defined in many different ways and it is each company's responsibility to establish an overall definition of the business risks and the subcomponents hereof (Lam, 2014). However, most companies divide risks into three main categories: strategic risks, financial risks and operational risks (Aven, 2008).

Financial risk

Financial risk concerns risks from volatilities in interest rates, commodities and foreign currencies, and covers market risk, liquidity risk and credit risk (Walker, Shenkir, & Barton, 2002). Such risks are usually highly controlled and an integrated part of management's focus as financial information is a key factor of stakeholder communication and measure of performance (Mohammed & Sykes, 2012). In order to understand a company's financial risk, the nature of transactional exposure and cash flows need to be understood. However, a more general financial risk is the economic exposure from the interaction between changes in macroeconomic variables and the overall competitive position of the company (Moles, 2016).

According to Woods & Dowd (2008) and Aven (2008), financial risks can be classified as market risk, credit risk and liquidity risk.

1. *Market risk* is one of the best-known risks and is dependent on changes in the value of an underlying component, such as asset return, bond prices, stock prices, commodity prices, or exchange rates etc. (Dionne, 2013; McNeil, Frey, & Embrechts, 2015).
2. *Credit risk* is linked to debtors' payment problems and is defined as the chance of default by any counterparty, which typically arise due to payment failure (Woods & Dowd, 2008).
3. *Liquidity risk* relates to access to capital and includes the possibility of not having sufficient funds to meet short-term financial obligations, which might stem from an asset not being sold or bought rapidly enough to prevent a loss (Dionne, 2013; McNeil et al., 2015).

Operational risk

Unlike financial risk, operational risk is more challenging to define. In the early stages of risk management, operational risk was defined in negative terms as any other risk than financial risk

(Lam, 2014). Over time, industries converged to a more common meaning of operational risk, defined as the risk of loss from inadequate internal processes, systems, people or external events (Lam, 2014). Operational risk has many definitions in previous studies. Aven (2008) describes operational risk as situations disturbing the normal operating situation, including accidental events, failures and defects, loss of key personnel etc. Similarly, Deloitte (2013) defines operational risk as major events that may affect a company's ability to execute the strategic plan. Walker et al. (2002) add to previous definitions by defining operational risk as the risk associated with the company's processes, systems, technology and people. Dionne (2013) portrays a similar view by describing such risks as losses from failed or inadequate external events, internal processes or systems and people, such as IT system breakdown, employee errors or fraud. According to Mohammed & Sykes, (2012), operational risks are usually managed from inside the company and typically focus on safety and health issues required by industry standards and regulations. According to Lars Ragnar Vigdel, EY, all risks will eventually have a financial impact. Therefore, companies should focus on their main operational risks since there will be less financial impact when these are managed properly (L.R. Vigdel, personal interview, March 08, 2018). The main operational risks include regulatory risk, cybersecurity risk, reputational risk, political risk, environmental risk and safety risk etc. (Deloitte, 2013a, 2015b; Lam, 2014; Obersteiner, 2001; Root, 1972; University of Notre Dame, 2018).

Strategic risk

Strategic risk relates to factors and aspects that are important for the company's long-term strategy, including mergers and acquisitions, technology, political conditions, laws and regulations, competition, labour market etc. (Aven, 2008). Deloitte (2013) refers to strategic risks as risks that affect a company's strategic objectives and business strategy.

The above mentioned risks are, according to literature, the key business related risks. The remaining sections of this chapter will outline how these risks should be managed.

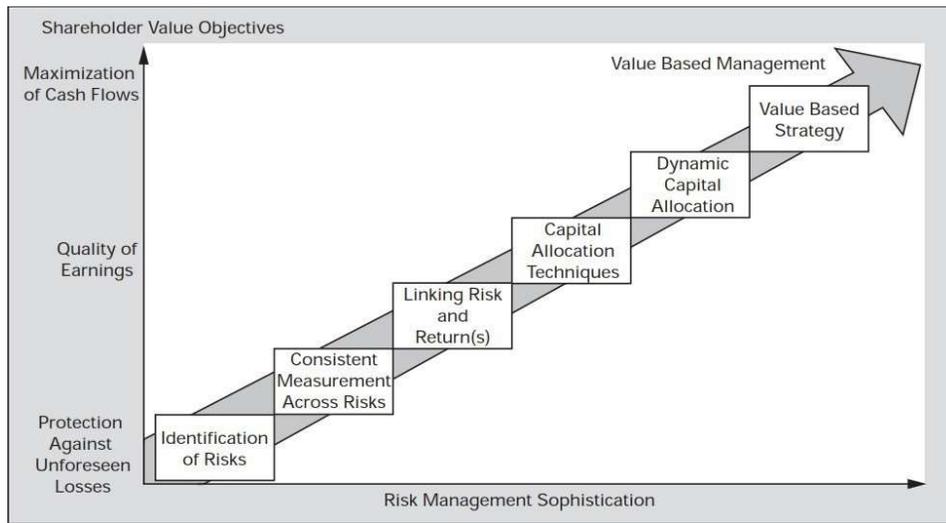
2.2 Risk management

Risk management is defined as a framework allowing companies to prevent conditions, activities and events that may affect the company and its ability to reach its visions and goals (Dionne, 2013).

The concept of risk management was primarily considered as an insurance-related concept. Research on risk management began after World War II, mainly associated with market insurance to protect companies and individuals from various losses related with accidents (Dionne, 2013). Other forms of risk management surfaced in the 1950s, when the market insurance seemed incomplete and too costly to protect against pure risks (Dionne, 2013). Moving beyond the insurance foundations, risk management began to emphasise on protecting companies from major catastrophic event. The concern on managing risk therefore changed to a general focus of managing a wide variety of business risks (Moeller, 2007).

Today, organisations face a wide range of risks, which they need assistance in overcoming in order to make more rational cost and risk-related business decisions. That is the process of risk management (Moeller, 2007). According to Moles (2016), the concept of risk management adheres a logical process involving three steps of identifying risks. The first step is the awareness of the risks the company is exposed to, followed by the second step involving the measurement of those risks in order to determine their materiality and impact. The third and final step is the risk adjustment through adopting policies and actions to reduce and manage the risks (Moles, 2016). Clarke & Varma (1999) argues that there is no reward without risk and that an integrated risk management approach allows companies to deliver superior performance consistently while managing risk proactively. They argue further that risk and return performance have a normal distribution with most companies performing around the median whereas the performance when comprehending risk more efficiently is reflected in their long-term stock prices, see **Figure 3** (Clarke & Varma, 1999).

Figure 3: Clarke & Varma's shareholder value



Source: (Clarke & Varma, 1999, p.419.)

2.2.1 Risk identification

As mentioned in the previous section, Moles (2016) argues that there are three steps of risk identification which follows a logical process: risk awareness, measurement of impact, and risk adjustment. These three steps will be outlined in this sub-section.

Risk awareness

Some risks are well known to a company as they have long been identified, whereas others will emerge due to changing conditions (Moles, 2016). Casserley (1993) describes how to become aware and identify risks and divides risks into three categories: risks that are both unknown and unmeasurable, known risks that are unmeasurable, and risks that are both known and measurable. Firstly, an unknown and unmeasurable risk is one that has not manifested itself and is therefore not apparent (Moles, 2016). Secondly, identified but unmeasurable risks are those where there is lacking data to base an evaluation of a probable consequence, even though the risk is known. Finally, when the risk is both known and measurable there are many ways to build a statistical model in order to predict future behaviour and limit the risk exposure (Moles, 2016).

Risk measurement

Measuring risk is to transform the risk into a quantifiable unit in order to measure its impact. When the quantifiable risk has been measured and the exposure has been determined, strategic decisions and appropriate course of actions can be made (Moles, 2016).

Risk adjustment

Risk adjustment is the change in the nature of a risk from an undesirable level to an acceptable one, which can be achieved by either transferring or grouping risk. Reaching an acceptable level can be achieved by using insurance, hedging, or changing behaviour through strategic decisions to minimise undesirable risk (Moles, 2016). Risk assessment, as other management tasks, needs to be kept under continuous review as there are constant changes in circumstances. Additionally, the more familiar companies become with their identified risks, the better they will be at assessing risks and handle the consequences (Moles, 2016).

2.3 Enterprise risk management

Risk has never before received more attention on how it should be managed by companies (Deloitte, 2015b). Executive management, the board of directors, investors and regulators put pressure on companies to clearly communicate how business risks are identified, approached and managed within their risk appetite. *Enterprise risk management* (hereafter *ERM*) is a paradigm designed to increase top management's ability to oversee all risks the company faces (Beasley, Clune, & Hermanson, 2005). ERM is an ongoing process in a company that is applied in the strategy and is designed to identify potential events that might affect the company, as well as to manage risk within the risk appetite (COSO, 2004). RIMS (2011) defines ERM as the strategic discipline that supports the accomplishments of a company's objectives by addressing the full range of potential risks and manages the combined impact from those as an interrelated risk portfolio. COSO (2016, p.10) defines ERM as '*the culture, capabilities, and practices, integrated with strategy-setting and its execution, that organisations rely on to manage risk in creating, preserving, and realising value*'.

Previous research has investigated reasons why some companies adopt ERM, while others do not. Nocco, Insurance, & Stulz (2006) argues that a company can manage risks either individually on a decentralised basis or collectively within a strategic and coordinated framework. The latter refers

to the ERM approach and the authors argue that companies that manage to create an effective ERM will have a long-run competitive advantage over those that monitor and manage risks individually (Nocco et al., 2006). By systematically and consistently managing and measuring risks while giving the managers the knowledge and incentives to optimise the trade-off between return and risk, a company enhances the ability to execute its strategic plan (Nocco et al., 2006). Similarly, D'Arcy (2011) argues that the core function of ERM is to consider all types of risks faced by a company.

2.3.1 Risk governance

Risk management is a key part of corporate governance and should be defined by the board of directors or monitored by independent directors in a risk management committee if the company is highly exposed to various risks (Dionne, 2013). Beasley et al., (2005) suggest that leadership from top management is crucial to the deployment of ERM and encourage focus on ERM effectiveness and to enhance protection of shareholder value. It is crucial that top management base their decisions primarily on risk and use comprehensive information on the company's integrated risk management to compare such risks against those of new investments. A *Chief Risk Officer* (hereafter *CRO*) is a senior manager of risk management that holds decision-making powers rather than monitor risk measurement and analysis in a passive manner (Beasley et al., 2005). Nocco et al. (2006) argues that ERM creates shareholder value through its effect on organisations at both a company-wide level and business-unit level. ERM creates value at a company-wide level by allowing management to manage and quantify the risk-return trade-off faced by the company. At the business-unit level, ERM develops an environment for senior management and all employees throughout the organisation. Thus, a well-structured ERM system guarantees that all material risks are "owned" and risk-return trade-offs are carefully assessed (Nocco et al., 2006). The Danish Committee on Corporate Governance has established recommendations for best practice guidelines for management with shares traded on a regulated market. The committee recommends the board of directors to meet at least once a year to discuss the developments and the risk plan for the organisation (Committee on Corporate Governance, 2014).

Risk ownership is the responsibility of the whole business unit. Since top management sets the governance approach, Deloitte (2014) has identified six actions a board of directors can take in order to enable a highly risk managed governance approach.

1. *Define the risk oversight role of the board:* Responsibilities of the board include setting the tone and expectations as well as initiating the activities and communication that constitute risk management. Although being accountable for the risk oversight process, the board of directors may delegate responsibility to a risk committee, complementing the role of the board and share their insights and findings.
2. *Cultivate a risk intelligent culture within the company:* Employees at every level should manage risk as an intrinsic part of their jobs and understand the risks of all activities they undertake and manage them accordingly. Additionally, the board of directors or a risk committee should set expectations for top management about what information they expect and how it should be conveyed. Furthermore, the risk committee should consider to weave risk management practices into job descriptions, work processes, and performance appraisals, as well as incorporating risk-related objectives into the company's executive remuneration.
3. *Assist management to incorporate the risk into the company's strategy:* The risk committee should integrate risk management into the strategic planning by considering risks across the company, prioritising the risks and allocate risk management resources appropriately. The committee should develop processes that verify the value creation and preservation from risk management that define the risk appetite and identifies the risk tolerance level.
4. *Assist in defining the company's risk appetite:* A risk appetite is the level of company-wide risk that top management is willing to undertake with respect to certain actions such as new product development, acquisitions, or market expansion etc. Additionally, companies need to have a greater appetite for rewarded risks, such as new product development or new market entry, and a lower appetite for unrewarded risks such as operational failures. Risk appetite is usually determined by monetary figures, percentage of capital, revenue, or other financial measures. Once the risk appetite level is set, management should define the risk tolerance level that expresses the threshold level of risk in terms that can be used by decision-makers. Also, a company might implement a 'no tolerance' for safety incidents by applying a zero incident policy. It is management's responsibility to continuously monitor the company's risk exposure, evaluate the exposure level against the set risk appetite, and

adjust risk policies and tolerances accordingly to align the risk exposure with the desired level of risk exposure.

5. *Execute the risk intelligent process:* The risk committee can collaborate with management to develop a joint approach to process design and procedures by evaluating the processes where risks are systematically identified, managed and reported. Additionally, the risk committee should establish policies jointly with top management that specify circumstances where management must obtain board of directors' approval for decisions, while noting that the role of the board is risk governance rather than risk management. Furthermore, it is important to clarify the accountability at top management and board of director's levels in order to verify that correct responsibilities of risks have been assigned to specific members of the management team.
6. *Benchmark and evaluate the process:* Top management should set a governance approach that applies systematic mechanisms for evaluating and improving risk governance in order to identify, implement and prioritise improvements. Risk governance is a continual process and should be considered as intrinsic to the conduct of business. An efficient risk governance approach should transform risk management from merely a part of risk avoidance to an essential application in every initiative, activity and decision.

2.3.2 Risk appetite

As mentioned in Deloitte's actions for the board of directors in the previous section, companies need to determine the right amount of risk that can be undertaken in order to operate on a profitable level. A reduction in risk enables organisations to decrease the amount of costly equity capital required to support its operating risks. Therefore, risk management can substitute equity capital and is thus viewed as an important task for management to evaluate in terms of the trade-off between increase in active risk management and holding a greater buffer of cash and equity (Nocco et al., 2006). Financial distress arise when a company is forced to pass up a positive net present value activity due to a shortfall of cash. It is common for companies to develop a certain maintenance level of cash flow or earnings and subsequently design the risk management structure to ensure this minimum holds under all circumstances. Through an efficient ERM strategy, management should aim to limit, rather than minimise, the probability of financial distress at a level

that maximise company value. Minimising the probability of financial distress is not in the interests of shareholders as that would result in investments similar to safe treasury bills. Rather, management should optimise the organisation's risk portfolio by a trade-off of big shortfalls and the costs of the expected gain from retaining or taking risks (Nocco et al., 2006). Dionne (2013) defines risk management as a set of operational or financial activities that maximise the value of a company by decreasing the costs associated with cash flow volatility, such as investment financing, expected income taxes, risk premium to stakeholders and costs of financial distress. Strategies for risk management typically focus on reaching company objectives, adhering to controls as a means of managing risks, and meeting with regulatory requirements (RIMS, 2011). Furthermore, risk appetite is defined as an established amount of risk that is aligned with business objectives by putting strategy into practice and serve as foundation for identifying, assessing and responding to risk (COSO, 2017).

2.4 Risk frameworks

How prepared are companies for the risks and opportunities that lie ahead? How can management find the unexpected before it finds them? To answer such questions, management can implement certain risk management standards, frameworks or approaches that will guide them to a good ERM practice.

2.4.1 Risk management standards

Risk management is a discipline that is constantly evolving. Guidelines and standards are periodically modified in the light of new innovative practices or new research, thus making it challenging for managers to stay updated. RIMS (2011) highlight six primary standards most widely adopted by organisations, defined as established requirements that enact processes, methods and practices under the jurisdiction of a standards body. One standard might be better suited for one company's purposes depending on the main risk management strategy and desired objective of the company. The most common standards for risk management are ISO 31000, OCEG, BS 3100, COSO and FERMA, as outlined below.

- *ISO 31000*: The international standard setting body *International Organisation Standardisation* (hereafter *ISO*) developed the ISO 31000 risk management principles and guidelines that are structured into eleven principles, a five-part framework and several processes (RIMS, 2011). The ISO 31000 provides guidelines and directions on how organisations can integrate risk-based decision making into its planning, management, governance, reporting, policies, culture and values (ISO, 2018). The standard is not specific to an industry, size or type of organisation and merely focuses on actions for the identified risks to improve the company's performance on cost efficiency (RIMS, 2011).
- *OCEG "Red Book" 2.0*: The Open Compliance and Ethics Group (hereafter *OCEG*) developed a standard of aligning and integrating *Governance, Risk management and Compliance* (hereafter *GRC*) in a framework divided into two parts; the Red book and the Burgundy book (RIMS, 2011). The Red book contains the GRC capability model, providing an overview and principles for the standardised practices. The Burgundy book contains GRC assessment tools and provides everything a company needs to assess GRC capabilities, i.e. evaluate the design and operating effectiveness of the GCR capabilities at the same time as reducing the cost of such evaluations (OCEG, 2015). This framework provides a unique spotlight on investigations, remediation and technology and is a process closely aligned with security practices such as codes of conduct and compliance. The standard is suggested most suited for larger organisations, where technological and human resources are abundant (RIMS, 2011). OECD (2015) argues that disclosure of the system for managing and monitoring risk is increasingly viewed as good practice.
- *BS 31100*: The British Standards Institution developed the BS 31100 standard and is drafted to be consistent with the ISO 31000 general guidance on risk management. The standard pays particular focus on the benefits of using a risk maturity model to improve risk management capability in the company. It illustrates how this type of planning tool contains the basic elements of an efficient risk management processes and describes the repeatable processes' evolutionary path from ad hoc to mature (RIMS, 2011).
- *COSO*: COSO is a professional association dedicated to guiding executive management towards a formation of more effective, ethical and efficient business operations. COSO suggest companies to implement ERM to improve the connection of risk oversight with the

establishment and protection of stakeholder value. The framework contains eight components based on identified best practices and the development of consistent approaches and is thus believed to be successfully implemented by all companies in achieving their objectives (RIMS, 2011). The COSO framework will be further explained in section 2.4.2.

- *FERMA: The Federation of European Risk Management Associations* (hereafter *FERMA*) adopted a standard that defines risk as the combination of the probability of an event and the consequences. Thus, FERMA stresses that any risk-related event has both opportunities and threats to success (RIMS, 2011). FERMA describes the risk management methodology as identifying all risks to achieving company objectives and applying risk treatments that add maximum value. Since the risk identification of the risk management process is concerning the entire company, it must be an integrated part of the culture. Therefore, responsibilities for risk management are suggested to be part of job descriptions in order to promote operational efficiencies at all levels. The FERMA standard, similar to ISO 31000 and COSO, highlights the importance of risk management monitoring as a process of continuous improvement. The framework includes regular audits of compliance with risk management standards, policies and assurances that appropriate risk treatments are in place and that procedures are understood and followed throughout the company. By ensuring these procedures are followed, the company is able to determine whether the intended results are efficiently achieved (RIMS, 2011).

2.4.2 COSO

This section will address COSO's standard framework as it is recognised as the leading guidance for implementing effective risk management (COSO, 2017).

COSO is a private sector initiative seeking to develop guidance and comprehensive frameworks on ERM, internal control and fraud deterrence designed to improve organisations' oversight and performance (COSO, 2013). COSO released the *Internal Control - Integrated Framework* in 1992 for designing, implementing, conducting and appraising the effectiveness of internal control. Since then, the framework has been updated due to the ever changing business and operating environment that progressively have become complex, technologically driven, and global (COSO,

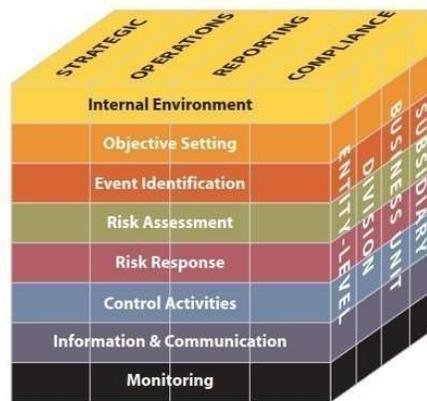
2013). The fundamental focus of COSO was not on risk, but rather the reasons behind the internal control issues that had resulted in financial reporting failures of several major corporations in the 1970s. COSO had its first release in 1987, named *The Treadway Commission Report*, which called for management to report on the effectiveness of the internal control systems. The report emphasised on key elements including a code of conduct, strong control environment, competent audit committee and a strong management function (Moeller, 2007). Times of business failures and scandals including employees, investors and other stakeholders suffering terrible losses, called for increased risk management and corporate governance practices with new regulation, law and listing standards. Thus, a demand for an ERM framework that could contribute key concepts and principles with clear guidance became even more essential. As a result, COSO released the *Enterprise Risk Management - Integrated Framework* in 2004 (COSO, 2004).

ERM – Integrated Framework

The framework was developed to allow organisations to efficiently develop and manage internal control systems to enable their chances of reaching objectives and successfully adapt to changes in the business environment (COSO, 2013). Since its publication, the framework has been extensively applied globally across industries, enabling companies to identify and manage risks within a fixed risk appetite that is linked to objectives. Thus, the COSO framework enables companies to clearly connect ERM with a multitude of expectations from stakeholders by facilitating companies to anticipate risks (COSO, 2017).

As mentioned in section 2.3, COSO defines ERM as the integration of culture, capabilities and practices in strategy-setting that companies depend on to manage risk and create value (COSO, 2016). The COSO ERM framework is a three-dimensional cube comprising of four strategic objectives of company risks and eight risk components combined with multiple entity levels ranging from a headquarter-level to entity-level (Moeller, 2013). The three-dimensional framework is found in **Figure 4**.

Figure 4: The COSO framework



Source: (COSO, 2004, p.5.)

As described above, the ERM framework includes eight interrelated components derived from the way management runs the business and include internal environment, objective setting, event identification, risk assessment, risk response, control activities, information and communication and monitoring (COSO, 2004). The remainder of this section will outline the risk components of the ERM framework and describe how the tool is applicable within a company.

1. *Internal environment*

The internal environment is the basis for all other components in the framework as it influences how objectives and strategies should be established, the structure of any risk-related business activities, and how risks are identified and managed (Moeller, 2013). It is where management sets the tone of the company and the foundation for how risk is managed by the employees in the environment they operate in (COSO, 2004). The framework has a future philosophy-oriented approach to current practices relating to risk management philosophy, risk appetite, board of directors' attitudes, assignment of authority, responsibilities and corporate mission statement etc. (Moeller, 2013). In essence, all enterprises need to have these control environment approaches in place to be able to manage their risks, regardless if the company has a high or low appetite for risk (Moeller, 2013).

2. *Objective setting*

Management must establish strategic objectives in order to identify potential events that might affect the company's results (COSO, 2004). The objective setting component of the ERM framework

sets preconditions essential for management in order to establish an effective ERM process. Management should establish strategic objectives covering its reporting, compliance and operations activities that are high-level goals aligned with the company's vision (Moeller, 2013).

3. *Event identification*

Events are occurrences, external or internal, to the company that affect the achievement of objectives or implementation of the ERM strategy. Such events include external economic events, natural environmental events, political events, social factors, internal infrastructure events etc. (Moeller, 2013). It is essential that such events are identified and distinguished between risks and opportunities in order for opportunities to be linked to management's objective-setting processes (COSO, 2004). A company must define potential significant risk events and thereafter monitor such events by putting processes in place. The idea is to establish a set of objectives together with measurement criteria needed to assess those objectives, as well as criteria for risk tolerance to promote counteractive actions (Moeller, 2013).

4. *Risk assessment*

Risk assessment is a key component of the ERM framework defined as the stage where companies evaluate all risks that might impact their objectives. At this stage, companies consider the potential likelihood and impact for each respective risk and develop approaches to react to these risks (Moeller, 2013). Companies face risks from both internal and external sources and risk assessment involves a continuous and dynamic process of identifying and assessing risks in order to achieve company objectives (COSO, 2013). A company's risks are relative to the established risk appetite and tolerance set out by top management, which is why risk assessment forms the basis for determining how risks should be managed (COSO, 2013). The risk assessment should be viewed from two perspectives: assess the likelihood of occurrence by estimating the probability that the risk will occur, and estimate the impact of a risk event (Moeller, 2013). However, the idea of the ERM framework is not to develop a precise calculation of the risk but rather to provide an effective risk management framework.

5. *Risk response*

Subsequent to having identified the risks, companies should develop an approach for a risk response that properly covers the identified risks, with consideration given to the company's risk appetite (Moeller, 2013). Risk responses are selected by management and includes risk avoidance, risk

reduction, risk sharing or risk accepting (COSO, 2004). The company should develop response strategies for each respective risk and consider the costs versus benefits for every potential risk response and assess the ones that are most aligned with the overall risk appetite (Moeller, 2013). To do this, management must go back to the established risk objectives and risk appetite ranges and readdress the likelihood and impact related to those risks, in order to get an overview of the risk responses (Moeller, 2013).

6. *Control activities*

Control activities are activities performed at all levels of the company and developed through procedures and policies that ensure management's risk mitigation strategies are carried out (COSO, 2004). When an appropriate risk response is selected, management should choose the control activities required to ensure the risk responses are executed in an efficient and timely manner (Moeller, 2013). The control activities can be detective or preventive in nature and may address a range of automated and manual activities such as approvals, authorisations, reconciliations, verifications, and business performance reviews (COSO, 2013). More specifically, the supporting ERM framework suggests several standard control activities including top-level reviewers, information processing, physical controls, performance indicators, segregation of duties etc. Some control activities will be specific to individual units, although all should be important components supporting the company's ERM approach (Moeller, 2013).

7. *Information and communication*

This component covers the process of communication of information flow that identifies, analyses and discloses relevant information in a form that enables employees to perform their responsibilities (COSO, 2004). This component of the ERM framework consist of processes and tools linking other ERM components together as the importance of each risk component must be communicated to all company stakeholders (Moeller, 2013). Communication is the constant and continual process of obtaining, providing and sharing necessary information that are obtained from both external and internal sources. External communication provides information to external parties in relation to expectations and requirements, whereas internal communication is the channel where information is circulated throughout the company, up and down the entire entity (COSO, 2013).

8. *Monitoring*

The comprehensiveness of the company's ERM function must be monitored in order for modifications to be made as necessary (COSO, 2013). The idea behind the monitoring component is not merely to identify deficiencies or faults, but to find areas where the ERM framework can be improved (Moeller, 2013). Monitoring activities includes verification in the form of ongoing evaluations, separate evaluations, or a mix of the two in order to ascertain whether the controls that mitigate risks are present and functioning. The findings must be evaluated against established criteria by regulators or top management and any deficiencies are to be communicated to either the board of directors or management as appropriate (COSO, 2013).

To conclude, components of ERM are not a serial process with one components only affecting the next. Rather, it is a multidirectional process where all components influence one another (COSO, 2004).

2.4.3 Deloitte's 'Risk Intelligent Enterprise' approach

Most companies implement ERM frameworks merely as a response to regulators and investor demands for more effective risk management (Deloitte, 2015b). Even though an ERM framework can assist a company in organising risk-related activities, it is not necessarily sufficient in itself to embed a sustainable risk consideration into the company's processes of decision-making (Deloitte, 2015b). Companies must take on risks in order to create value, but also manage risks in order to protect value. Therefore it is of high importance to find balance between risk and reward (Deloitte, 2015a). As a result, Deloitte developed a philosophy called *Risk Intelligence* (hereafter *RI*) that not only focuses on risk mitigation and avoidance, but also on risk taking as a means to value creation (Deloitte, 2013b). Deloitte continues by contending that it is the rare company that intelligently manages the full range of risks, sufficiently performs risk assessments and prepares responses to major potential risks. Hence, when ERM is done right by companies, they deserve a special designation called *Risk Intelligent Enterprises* (Deloitte, 2013b). Deloitte (2015a) describes a range of optimal risk taking that identifies a sweet spot, defined as the maximum return in relation to risk. Top performing companies operate in this sweet spot by efficiently managing and measuring key risks of decisions and opportunities, called *RI* decision-making. This is Deloitte's risk management

philosophy, which focuses on withholding a perfect balance between risk and reward, i.e. creating value through risk taking and losing value by failing to manage those risks (Deloitte, 2015a).

When assigning a RI management, it is vital for companies to understand where they stand by comparing the capabilities against how mature their current risk management is. The maturity model is found in **Figure 5**.

Figure 5: Deloitte’s RI maturity model



Source: (Deloitte, 2015b, p.5.)

The first stage represents the initial stage, where risk management is on an ad hoc basis without any clear strategy or guidance (Deloitte, 2015a). The second stage is the fragmented stage, which includes independent risk management activities with limited focus on aligning risks to company objectives. Risk is defined differently in different parts of the company and managed in silos with limited connections between risks (Deloitte, 2015b). The top down stage of the model includes a common risk management framework for the company with clear policies and a company-wide approach to risk assessment and response (Deloitte, 2015b). Risks are set out by the board of directors or top management and communicated across risk functions, creating routinised risk assessment (Deloitte, 2015a). The integrated stage includes a fully defined risk appetite and company-wide risk monitoring, measuring and reporting (Deloitte, 2015b). The final stage is the RI stage, where risk is embedded in strategic planning, capital allocation and business development. At this stage, the company has developed clear linkages between risks and incentives, as well as risk scenario and industry benchmarking (Deloitte, 2015a).

Additionally, Deloitte’s ERM Model in **Figure 6** describes three levels of responsibility related to risk management and comprise of responsibility for risk processes at the base, responsibility for risk

infrastructure in the middle, and responsibility for risk oversight and governance at the top. The board of directors are responsible for the top level, executive management for the middle level, and the business units and functions for the base level (Deloitte, 2015a).

Figure 6: Deloitte’s RI Enterprise Levels



Source: (Deloitte, 2014, p.4.)

As seen in **Figure 6**, there are three levels of responsibilities in a RI enterprise, including oversight, systems and processes. These levels are related to **Figure 5** of the risk management maturity stages, where each respective level can be ranked on different stages of maturity.

1. The oversight level is related to the risk governance applied by the board of directors. A mature risk management involves a top-down approach that sets the tone for the whole company with the aim to foster a RI culture, approving risk appetite, determine key components of the company’s ERM programme and have ongoing discussions of company risks with management (Deloitte, 2015a). Furthermore, a mature risk governance approach is one where ownership of risk is the responsibility of each employee since consequences of their actions are incorporated into their core values. A less mature level is one where risk is perceived to be dealt with by the business itself, with no personal responsibility by any employee (Deloitte, 2015a).

2. The risk infrastructure level includes the company's risk systems and how management assesses risks by monitoring and planning response activities. Risk infrastructure includes the creation of a common risk framework within the company that provides guidance and direction throughout the organisation (Deloitte, 2015b). The risk infrastructure component includes risk champions, defined as top management employees highlighting the importance of risk across the company. A mature risk management attitude holds many risk champions across all functions of the company (Deloitte, 2015a). Furthermore, this level also includes an external disclosure component for both disclosure of risks and long-term viability statement. A mature risk disclosure approach is identified by detailed risks linked to key drivers of the business, whereas a less mature approach includes generic industry risks with no distinction to those of the company's competitors (Deloitte, 2015a). A mature viability statement is characterised by clear linkages to long-term strategic objectives, whereas a less mature statement is not adding any information beyond a 12-month horizon (Deloitte, 2015a). Finally, this level also contains monitoring and reporting procedures that includes both frequency and linkages to strategic objectives. A mature risk monitoring process is automated and assessed on a continuous basis, whereas a less mature process is done on a demanded basis. Additionally, a mature level of monitoring risks is one where risks are reported and quantified with respect to the strategy, whereas a less mature level is one with a lacking linkage to company objectives (Deloitte, 2015a).
3. The processes level relates to risk ownership of the business units and support functions. Risk ownership of business units mainly refers to identifying, assessing, responding, monitoring and reporting risks to management (Deloitte, 2015b). The risk identification component of the processes level includes defining the various types of risks exposed to the company. A mature level of risk types include all risks that possibly can interrupt the business, whereas a less mature level only focus on financial risks (Deloitte, 2015a).

2.5 Risk disclosure in annual reports

According to Lam (2014), one of the most sensitive and important responsibilities of the board of directors is the communication with the company's stakeholders, where the annual report is considered the main vehicle to disclose key information. Risk disclosure is an essential part of

corporate governance and disclosing risk has received more focus since the early 2000s due to a series of corporate failures and incidents that have damaged well-known brands. However, the issue was truly brought to regulators and investors' agendas after the global financial crisis in 2008 (ACCA, 2014). In the effort to restore investor confidence after the financial crisis, companies have been voluntarily disclosing business risks to increase transparency towards the stakeholders (ACCA, 2014). Emm, Gay, & Chen-Miao (2007) argues that the amount of voluntary disclosure of risk in a company's financial reports is subject to three main considerations: the nature and extent of market risk exposure, the need to protect proprietary information, and the demand for capital market access. Annual reports are focused on historical financial results and insights on whether the board of directors has fulfilled its role and performed in the shareholder's best interest (Linsley & Shrives, 2000). Another perspective of the annual report is to be forward looking, as shareholders should know the company's outlook in order to be able to assess and manage their position in the company along with their own risks. Disclosure of risk management within annual reports is a primary contributor to the latter purpose of the annual reports towards the shareholders (Linsley & Shrives, 2000). Solomon, Solomon, Norton, & Joseph (2000) studied frameworks of risk management and RMD and developed an ideal risk disclosure framework to assess opinions of representative investors. Their results presented that a third of the investors agree that increased disclosure of corporate risk would help investment decision-making. Additionally, they found that it is advisable to follow a detailed and individual risk information reporting rather than a general statement of the overall business risk, as investors find it inadequate.

2.5.1 Minimum risk disclosure requirement

Since 2003, the *International Accounting Standards* (hereafter *IAS*) have addressed requirements on risk disclosure regarding presentation, recognition and measurement of financial instruments. IAS released *IAS 32 Financial Instruments: Reporting* and *IAS 39 Financial Instrument: Recognition and Measurement* as the initial standards for addressing financial instruments in the financial statements (Deloitte IAS Plus, 2017). From 2007 and onwards, companies reporting according to the *International Financial Reporting Standards* (hereafter *IFRS*) have to comply with IFRS 7, which include new disclosure requirements than those previously required by IAS 32 and IAS39 on financial instruments (Deloitte IAS Plus, 2017).

IFRS 7 – Financial instruments: Disclosures

The objective of IFRS 7 is to provide disclosures in annual reports that enable users to assess two main categories: the significance of a company's financial position from financial instruments, and the extent of risks arising from such financial instruments as well as how they are managed (IFRS, 2018). The nature and extent of risk exposure from financial instruments include qualitative disclosures, quantitative disclosures, credit risk, liquidity risk, and market risk. Qualitative disclosure describes risk exposures for each respective financial instrument and the respective management policies, objectives and processes for those risks (IFRS, 2018). Quantitative disclosure describes the extent of risk exposure to each risk at the given reporting date, concentrations of risks, disclosures of market risk, liquidity risk and credit risk, and how they are managed (IFRS, 2018). Credit risk is the danger that one party of a financial instrument will suffer a loss, due to another party failing to pay for its obligation. Thus, disclosure requirements of credit risk include maximum amount of information on credit quality, description of collateral etc. (IFRS, 2018). Liquidity risk is the risk that a company will have complications in paying its financial liabilities and the required disclosures include a description of the risk management approach and a maturity analysis of financial liabilities (IFRS, 2018). Market risk is the hazard that cash flows or fair value of a financial instrument will fluctuate because of volatilities in market prices, including currency risk, interest risk and other price-related risks. Required disclosures about market risks include sensitivity analysis for each market risk type the company is exposed to, or a sensitivity analysis such as value-at-risk that reflects interdependencies of several components of market risks (IFRS, 2018). Additionally, a company must disclose risk exposures that are hedged and explain the risk management strategy for each respective risk exposure category (IFRS, 2018).

2.5.2 Incentives of voluntarily disclosing risk

Companies may decide to voluntarily disclose additional information on risk management than required by regulations, which is incentivised by potential value creation for the company. These potential value creations are supported by a number of theories, including agency theory, signalling theory, political costs theory and stakeholders' theory (Rajab & Schachler, 2009). *Agency theory*, in the setting of risk management, explains how the information asymmetry between the principals

(managers) and agents (shareholders) can be reduced from disclosure of risk factors beyond regulations. Thus, reducing information asymmetry gives incentives for managers to better act as stewardship on behalf of the agents through risk management activities (Jensen & Meckling, 1976). *Signalling theory* explains the incentive for managers to disclose more information to the market than required due to the intention to attract more investment through signalling their behaviour of best practice and willingness to generate transparency towards the stakeholders (Morris, 1987; Ross, 1977; Spence, 1973). Consequently, competitors will most likely comply with this standard as no company is willing to be unevaluated by the market, leading to mimetic isomorphism behaviour (DiMaggio & Powell, 1983). *Political costs theory* explains how companies can manipulate their image towards stakeholders in their favour by disclosing additional information than required to avoid potential political costs (Deegan & Gordon, 1996; Watts, Zimmerman, & Cliffs, 1986). *Stakeholders' theory* explains the influence of stakeholders towards management and company decisions. Management is expected to act in the best interest of stakeholders and live up to their demand. Clearly, the higher level of power the stakeholders possess, the more important it is for management to live up to their demands (Freeman, 1984). In the case where risk management is viewed as a value adding activity for stakeholders, there should be a positive relationship between power of stakeholders, management performance and risk management disclosure (Ullmann, 1985).

In addition to theories suggesting that risk disclosure beyond minimum requirement is value creating, several findings from researches agree with the same belief. Emm et al. (2007) argues that value creation from additional disclosure can arise by increasing market confidence from improved transparency towards shareholders. Such improved transparency will enable them to better assess whether management has sufficiently managed the company on behalf of them and thus make informed decisions about the company's business. Linsley & Shrives (2000) claim that providing forward-looking information can be value creating for stakeholders, as they can better manage their own risks and make portfolio management decisions. Studies by Lang & Lundholm (1996) and Botosan (1997) suggest that risk disclosure is a significant contributor to lower cost of finance. The papers argue that by disclosing greater amount of risk, management demonstrates confidence in their ability to manage future risks. This removes some uncertainty from lenders and enables companies to obtain lower cost of capital, which will directly lead to increased profit. Lars Ragnar

Vigdel, EY, believes there is a correlation between risk disclosure and stock prices as increased disclosure on risk in the annual report can result in less volatile stock prices (L.R. Vigdel, personal interview, March 08, 2018). Emm et al., (2007) argue that disclosures reduce asymmetric information and thereby reduce information costs for investors and analysts, which lead to larger followings by analysts. Linsley & Shrive (2000) also argue that this reduction in asymmetric information further enhances the attractiveness of shares due to reduced costs of information gathering, which also attracts smaller shareholders with limited resources to invest. All of the above enhance the liquidity and attractiveness of capital market considerations. Furthermore, by publicly disclosing business risks, management are encouraged to improve their willingness to manage their risks. Consequently, annual reports are more accountable as they provide greater use to the company's shareholders, potential shareholders, lenders, customers, and other stakeholders etc. (Linsley & Shrive, 2000).

2.5.3 Costs of voluntarily risk disclosure

While disclosing risks have many benefits towards the company and the shareholders, it may also be costly. Acher (1998) argues that risk information needs to possess two characteristics. Firstly, the information disclosed should not include too much commercially sensitive information that can be utilised by competitors or potential entrants. This could lead to a proprietary cost, hence putting a company at a disadvantage. Secondly, the disclosed risk information should be forward-looking. However, predicted risk outlooks are ex ante unreliable, which can contribute to shareholders misanalysing scenarios and subsequently mistrusting the company. Additionally, disclosure is costly to produce, referred to as non-proprietary costs, which refers to the costs associated with information gathering. Thus, on behalf of the shareholders, the board of directors should disclose risks to the point where the marginal cost equals the marginal benefit (Emm et al., 2007).

3 The oil industry

As mentioned in chapter 1, the motivation for undertaking this study stems from the increased focus on risk management from previous global turbulent events. The oil industry is used as population for answering the research question as it represents a homogenous population defined by a regulated industry with similar risk exposure among companies. Chapter 2 defined the concept of risk management and incentives to disclose risk management with the intention to create value. This chapter will provide an overview of the oil industry and review the main risks exposed to the operations, as well as industry specific reporting requirements on risk.

3.1. Key characteristics of the industry

The oil industry is divided into three sectors: upstream, midstream and downstream. The upstream segment discovers and produces crude oil and is commonly referred to as the exploration and production (E&P) sector (Tordo, Tracy, & Arfaa, 2011). The midstream segment stores, processes, markets and transports oil and other commodities, acting as a linkage between petroleum production facilities and consumers (The Petroleum Services Association of Canada, 2018). The downstream segment refines, purifies, and processes oil in order to turn the extracted hydrocarbon into usable products (Tordo et al., 2011). Moreover, an integrated company is one which operates within all three segments of the oil supply chain (E. Norheim, personal interview, March 07, 2018).

3.2. Historical events in the industry

Volatility in historical oil prices are explained by the short-term inelasticity of the underlying supply and demand curves. Demand is highly inelastic due to complexity for consumers to alter stock of fuel-consumption equipment, whereas supply is inelastic because it is time-consuming and inflexible to increase the capacity of oil fields. Therefore, an oil price volatility provides encouragement to hold inventories, but as inventories are expensive to hold they are not effective enough to fully offset the rigidity of supply and demand (Smith, 2012). The oil price has been highly volatile for the past four decades with two significant surges up until the 2000's. A serial of events in the 70's increased the oil price up to USD 40 per barrel, equivalent to a present value of USD 100

(2009), which was subsequently followed by a collapse in the 80's (Hamilton, 2009). However, the oil prices stayed at USD 20 per barrel until 2001, when it increased rapidly up until 2008. In July 2008, the oil price surged to an all-time high at USD 145, followed by a substantial drop to USD 50 per barrel (Hamilton, 2009). The historical oil price movement is seen in **Figure 7**.

Figure 7: WTI crude oil spot price¹, 1986-2018

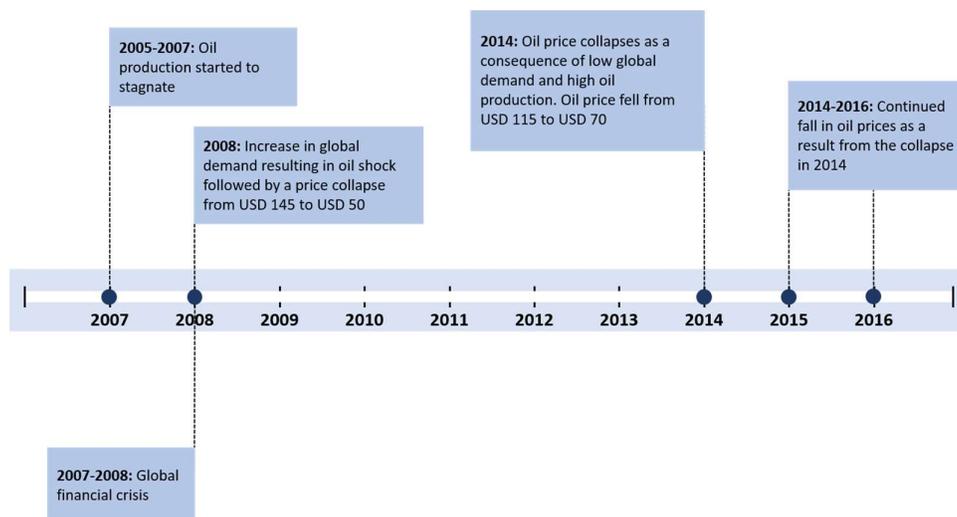


Source: Datastream, own construction

3.2.1 Oil collapses between 2007-2016

There have been two major oil price collapses in the analysed period in this study. The following sections describes those events and the drivers behind them, which are summarised in **Figure 8**.

Figure 8: Overview of historical events in the oil industry, 2007-2016



Source: (Hamilton, 2009; Hartmann & Sam, 2016; Naim, 2015; The Economist, 2014), own construction

¹ The oil price has not been adjusted for inflation.

Oil shock in 2008

The oil price experienced a steep climb from 2003 up until the collapse in 2008 (Fattouh, Kilian, & Mahadeva, 2013). One theory explaining this surge is the economic fundamentals of supply and demand, as the market for crude oil follows such forces. The main driver behind the surge was the rapid growth in global demand, largely contributed by China, which resulted in a large gap between demand and supply. In July 2008, an all-time high record for oil prices was set at USD 145 per barrel, only to be followed by a collapse in the oil prices down to USD 50 primarily due to the economic decline (Hamilton, 2009). Unlike previous oil crises, which primarily were caused by physical disruption of supply, Hamilton (2009) argues that the oil price shock in 2008 was caused by this significant increase in global demand. Prior to the crisis, oil production was stable throughout the 2000s, but started to stagnate between 2005-2007. As one of the world's most important oil exporter, Saudi Arabia had historically experienced volatile oil production due to a strategy to deliberately stabilise the world oil production in order to mitigate price fluctuations. However, after 2005, Saudi failed to meet expectations from International Energy Agency's World Energy Outlook 2007 and produced 850,000 barrels a day; which was far less than the 12 million barrels that were predicted. Thus, Saudi began to contradict its standard role as a stabiliser of the world production and their production decreased after 2005. The decline was argued to have been an additional factor to the stagnation in world oil production between 2005-2007. Furthermore, without Saudi's willingness to offset short-term shortfalls in world production and smooth out price changes, any disruption in supply or demand had a much bigger effect on oil prices than earlier (Hamilton, 2009). Consequently, OPEC members responded to the surging demand by increasing their production. However, years of restrained field investments eventually caused them to unsuccessfully meet the growing global demand and consequently consumption in other parts of the world was forced to decline (Hamilton, 2009; Smith, 2012). Since demand shocks induces the opposite covariance between price and quantity, prices had to rise in order to reduce the quantity that the production could not satisfy. What came as a surprise was that even at a level of USD 100 per barrel oil, it was not sufficient to limit the global demand to its supply level. The price increase continued until USD 145 per barrels, setting a historical record for oil prices in July 2008 (Hamilton, 2009). Hence, what followed was the collapse in oil prices, primarily due to a drop in global demand which came as a result from the economic crisis in late 2008 (Smith, 2012).

An alternative theory to explain the surge up until 2008 is the increased financialisation of the oil futures market, which allowed speculations to play a significant role in determining the spot price of oil (Fattouh et al., 2013). This view is shared by Michael Masters, manager of the private financial fund Masters Capital Management LLC, who is proponent of the opinion that the oil price collapse was the result of a speculative price bubble that popped (Hamilton, 2009). Fattouh, Kilian, & Mahadeva (2013) describe oil speculation as the action of buying crude oil for future use rather than current consumption, allowing one to take a strategic position on the expected change in oil prices. This may involve either buying physical oil to store as inventory or buying oil futures contracts. Both strategies are aimed at gaining economic advantages ahead of changes in oil prices. Therefore, because oil is traded as a financial asset rather than a physical commodity, financial investors such as swap dealers, hedge funds and commodity index traders were fuelling the oil futures market to a quarter trillion dollars worth of futures contracts by March 2008. This financialisation of oil future prices resulted in a speculative bubble in the spot price of oil (Hamilton, 2009). However, according to Alquist, Kilian, & Vigfusson's (2013), there is no indication that oil futures prices help forecast the spot price of oil. This conclusion is consistent with Chinn & Coibion (2014), who estimate that the oil futures roughly follow a random walk. Additionally, while the large trades of commodity futures contracts may have contributed to the miscalculation of the oil prices up until July 2008, this is not believed to be the dominant ingredient to the oil shock in 2007-2008 (Hamilton, 2009). Thus, the general conclusion is that the oil crisis in 2008 was mainly fuelled by the economic fundamentals consisting of two contributors: a low price elasticity of demand, and the shortage of supply due to the rapidly growing global demand (Hamilton, 2009).

Oil price collapse in 2014

After almost five years of stability, the oil price collapsed yet again. This time, the price fell over 40% from USD 115 to USD 70 per barrel in June 2014 (The Economist, 2014). Samuelson (2014) argues that the low demand and excess oil supply are the main causes of the oil price collapse. The factor supporting this argument was the unexpectedly low global demand explained by unforeseen economic weakness in China, Japan and Europe. Forecasters predicted growth of 1.3 *million barrels per day* (hereafter *mbd*), which contrasted the actual growth of simply 700,000 *mbd* (The Economist, 2014). The Economist (2014) argues that in addition to the weak economic activity, the low demand

was caused by a growing change away from oil and towards alternative fuels. Another key reason for the oil price fall was Saudi Arabia and their Gulf allies' decision not to restore the oil price, as it would mean sacrificing their own markets share. As a result, the Saudis decided to maintain their level of production as they could tolerate low prices due to the low costs for drilling oil as well as having a reserve of 900 billion (The Economist, 2014). Subsequent to the collapse in 2014, the low oil prices continued onto the following years (Hartmann & Sam, 2016; Naim, 2015).

3.3 Risk management in the oil industry

This section will outline the most common risks among oil companies as well as risk disclosing requirements in the Nordic oil industry.

3.3.1 Risk exposure

The oil industry is rather capital-intensive and companies are exposed to relatively straightforward risks. These risks include uncertainties around distribution, extraction, volatility in commodity prices, confounding political landscape, and other various factors that might impact operating costs and liquidity (Rudloff & Schultz, 2016). Several previous findings have addressed the topic of risk factors in the oil industry, which have resulted in similar findings. The financial service company BDO conducts an annual examination of the key risk factors disclosed by the largest 100 listed US Oil companies and generates a ranking by the percentage of companies that cite them (BDO, 2017). Additionally, North Carolina State University's ERM initiative conducts an annual global risk survey of C-suite executives and directors. The executives obtain perspectives on 27 risks likely to affect oil companies over the following years that cover three dimensions: operational, strategic and macroeconomic (Rudloff & Schultz, 2016). Below follows the most recognised risk factors in the oil industry.

Financial risk

Global economic conditions have been cited as key risks by 92-99% of the largest US oil companies since 2013, including market volatility, access to capital, increases in operating costs, bankruptcies,

financial risks tied to customers, suppliers and partners etc. (BDO, 2017). Additionally, as Walker et al. (2002) define financial risk as volatilities from commodities, the oil industry is evidently impacted by the risk of instability in the oil prices, as evident from section 3.2

Regulatory risk

Deloitte (2015b) found the largest consequence of all the regulatory requirements to be increased costs and limit on revenue generation through possible changes in business models. Regulatory risks for oil companies include expansion of safety and health requirements and increase in environmental enforcements of operations (Rudloff & Schultz, 2016). Legislative and regulatory changes imply a risk of increased cost of compliance due to tighter guidelines as environmental and safety compliances require enormous investments. For this reason, all of the top 100 listed US oil companies included regulatory risk in their disclosures between 2013-2017 (BDO, 2017). In 2016, executives cited regulatory changes as a top risk faced by a company for the fourth consecutive year (Rudloff & Schultz, 2016).

Cybersecurity risk

As technology has become increasingly necessary in more areas of business and the business environment becomes highly networked, risks from system failures and data security have consequently become critical (Lam, 2014). Cybersecurity is a type of operational risk that has experienced increased attention in recent years and moved from merely being an IT issue to impacting the whole company through potential cyber-attacks that might affect the business operations (Deloitte, 2015b). Cybersecurity has increased in significance among oil company executives since 2015, which has led to increased attention towards implementing technological solutions, effective incident response programme and increasing investments in protections against criminal and global threats. Therefore, it is crucial for companies to understand changes in their cyber threat environment and to hold a comprehensive security programme that is regularly tested (Rudloff & Schultz, 2016).

Reputational risk

Reputational risk has become a massive concern for companies due to the surge of social media, which permits instant worldwide communication that makes it tougher for companies to control how they are perceived in the marketplace (Deloitte, 2013a). The increased focus is captured in a survey conducted by Deloitte in 2013 where international executives responded that reputational risk impact 40% of their total business risks, as compared to merely 26% in 2010 (Deloitte, 2013a). According to Rudloff & Schultz (2016), executives for oil companies worry about their companies not being sufficiently prepared to manage an unanticipated crisis that may significantly affect their reputation. Recent events such as terrorism, major accidents, economic conditions in China, volatile oil prices, and breaches of high-profile cyber data strongly illustrate that the oil industry faces risks that quickly can result in their name being on the global news headlines (Rudloff & Schultz, 2016). Deloitte (2013) emphasises the increased focus on reputational risk in the energy sector as a consequence of attention from headlines about oil spills, fracking and the Alberta tar sands. Such reputational risks threaten companies viability, reputation and brand image (Rudloff & Schultz, 2016).

Political risk

Root (1972) define political risk as the possible event of a political occurrence in the home country or abroad that might cause a potential loss of profit or assets. Such political events might include war, expropriation, taxation, exchange controls, devaluation, import restriction etc. For oil companies, political risks on the international and local stage are top of the agendas due to events such as new country administrations, turmoil's in the Middle East and trade agreements being in limbo, which may create instability and interrupt business operations (BDO, 2017).

Environmental risk

Environmental risk is the increased level of uncertainty from changes in sustainability into more complex dilemmas (Obersteiner, 2001). In 2017, 85% of the largest listed US oil companies were concerned about potential costs and liabilities regarding pollution from previous or current operations (BDO, 2017). Shifts in customer expectations and preferences are hard to identify,

especially consumers' awareness on the climate change. Environmental risks also include a potential adaptation to new market realities such as change in consumer behaviour from increased pressure to replace fossil fuel consumption and production with alternative clean energy sources, which can have dramatic effects on the industry (Rudloff & Schultz, 2016). This is reflected in the industry by 33% of the largest oil companies citing energy efficiency initiation as a major risk factor in their latest reports, and 76-89% of the companies cited risk from availability of alternative energy sources as a risk from 2013 and onward (BDO, 2017). Additionally, from 2013 and onward, between 96-100% of the largest oil companies cited disruptions from extreme weather conditions or natural disasters as a key risk (BDO, 2017).

Safety risk

Health and safety risks concern hazards at the workplace, defined as the possibility of accidents and harmful substances and situations (University of Notre Dame, 2018). The Health and Safety Authority (2018) defines safety risks as potential sources of harm on a person in relation to occupational safety including professions exposed to slips, trips and falls, working at heights, electricity etc. The oil and industry is heavily exposed to risks regarding employee safety, including gas leaks, oil spills, blowouts, fires etc. (Statoil ASA, 2010). Following events such as the BP Deepwater Horizon incident, where 11 men died from an explosion, the focus has been on mitigating safety risks with companies investing heavily in safety precautions (Energy Digital, 2011).

3.3.2 Risk disclosure in the Nordic oil industry

All listed companies in the Nordic region are by definition Public Interest Entities (Federation of European Accountants, 2014). For Nordic countries, all companies with securities traded in a regulated market are required to use IFRS in their consolidated financial statements (IFRS, 2017). No industry specific risk reporting requirements are existent, besides the minimum reporting requirements for companies applying IFRS. The requirements are previously outlined in section 2.5.1. Espen Norheim, industry expert from EY, expects the oil industry to have experienced an increase in RMD over the past 10 years for two main reasons. Firstly, because of the general fight for capital where companies need to be perceived as the most trustworthy and professional

company in order to attract the best investors. Secondly, a trend is identified that companies with the greatest environmental and sustainability focus are the most popular and that risk management plays a key role in achieving such focus (E. Norheim, personal interview, March 07, 2018). Lars Ragnar Vigdel, EY, adds that companies in the oil industry benchmark their disclosures in the annual reports according to other players in the industry and adjust accordingly to their competitors (L.R. Vigdel, personal interview, March 08, 2018).

4 Hypotheses

Having reviewed existing literature on the concept of risk management and RMD in chapter 2 and gaining a fundamental understanding of the oil industry in chapter 3, this chapter outlines the development of the hypotheses used for later analysis.

4.1 Hypotheses development

The research question addresses two aspects of this study: the development in RMD and the value of RMD. To answer the research question comprehensively, five hypotheses are developed to test whether:

1. there is a positive development in RMD in the analysed period (hereafter *H1*),
2. all aspects of RMD develop in the same patterns in the industry (hereafter *H2*),
3. a company with high RMD experiences less negative impact on EBIT during downturns (hereafter *H3*),
4. there is a positive correlation between RMD and EBIT (hereafter *H4*),
5. there is a positive correlation between RMD and share price (hereafter *H5*).

The first two hypotheses contribute to examine the development of RMD, whereas the latter three hypotheses contribute to investigate the potential value creation from RMD.

It is important to clarify that this study has identified value creation of RMD in two classifications: value creation for company's operations and value creation for shareholders. H3 and H4 aim to investigate the former, whereas H5 examine the latter. In terms of value creation for a company's

operations, the underlying rationale for this study is that a company's risk management is expected to contribute value to the operations. This is in line with Dionne (2013), who defines risk management as the tool that prevents occurrence of any condition or event that may affect the company and its ability to reach its goals. However, as this study investigates disclosed risk management, it is assumed that RMD reflects the actual risk management in a company. Thus, H3 and H4 rely on the belief that the level of RMD in annual reports corresponds with the level of actual risk management. In terms of value creation for shareholders, no assumption is made as the hypothesis simply attempts to detect whether shareholders appreciate a company's RMD in the annual reports. The rationales behind the developments of the hypotheses are outlined in the remaining sections of this chapter.

4.1.1 H1: Positive development in RMD

From chapter 3, it is evident that the oil industry has been exposed to several macroeconomic events, including oil price collapses in 2008 and 2014 that have led to increase companies' risk awareness. Consequently, it can be assumed that companies have increased their focus on risk and thus increased the level of RMD in the annual reports for the period analysed. Additionally, Lang & Lundholm (1996) and Botosan (1997) argue that by disclosing greater amounts of risk, management demonstrate confidence in their ability to manage future risks. Therefore, it can be assumed that due to the increased uncertainty from macroeconomic events, companies should increase their RMD in order to provide assurance and confidence to their stakeholders. In addition, Espen Norheim, EY, expects the oil industry to have experienced an increase in RMD over the past 10 years due to fight for capital and the general positive trend in sustainability reporting (E. Norheim, personal interview, March 07, 2018). Based on the above arguments, the first hypothesis states:

H1: *There is a positive development in RMD among companies in the analysed period.*

4.1.2 H2: Companies develop their RMD in similar patterns

The second hypothesis is concerned with whether all aspects of RMD develop in similar patterns over the analysed period. Morris (1987), Ross (1977) and Spence (1973) explained the concept of signalling theory as the incentive to disclose information to attract more investments as it signals a 'best practice' and gives transparency to stakeholders. Consequently, DiMaggio & Powell (1983)

argued that competitors may follow such increased disclosure practice and replicate the industry levels, as they will not risk to be unevaluated by the market, leading to mimetic isomorphism behaviour. Lars Ragnar Vigdel, EY, supports this view by stating that companies in the oil industry benchmark their disclosed information and adjust according to their competitors (L.R. Vigdel, personal interview, March 08, 2018). Therefore, it can be expected that the focus of RMD would develop similarly for all companies in the industry, which is why the second hypothesis states:

H2: Companies develop their RMD in similar patterns throughout the analysed period.

4.1.3 H3: High level of RMD causes less negative impact on EBIT during downturns

As mentioned in chapter 3, there were two main events in the oil industry during the period analysed: the oil price collapses in 2008 and 2014. Since Dionne (2013) defines risk management as a tool that prevents occurrence of any condition or event that may affect the company and its ability to reach its goals, one could argue that the true value of risk management is evident in periods of downturn. Furthermore, Nocco, Insurance, & Stulz (2006) argue that companies applying an effective ERM approach will have a long-run competitive advantage over those who do not incorporate the same methodology. Evident from previous findings, risk can be value adding when managed properly, thus one can expect that a company with a higher level of RMD can experience less negative impact on its performance during downturns, such as the oil price collapses. In this hypothesis, value is represented by EBIT as a company's fundamental value lays within its operations (L. Topholm, personal interview, March 16, 2018). Furthermore, as described in the beginning of this chapter, this hypothesis relies on the assumption that the level of RMD corresponds to the actual risk management. Following this reasoning, the third hypothesis states:

H3: A company with high level of RMD experiences less negative impact on EBIT during downturns.

4.1.4 H4: Positive correlation between RMD and EBIT

As previously mentioned, Dionne (2013) defines risk management as a tool preventing events that may affect the company to reach its goals. Therefore, it may be argued that a company's risk management contributes value to the company. However, value is measured in different ways. Lars Topholm, equity analyst at Carnegie Investment Bank, argues that although a company may

generate cash from several income sources such as financial income and the stock market, the fundamental value lays within its operations. Therefore, Lars Topholm, Carnegie Investment Bank, argues that EBIT is an appropriate financial metric to examine whether risk management is value creating (L. Topholm, personal interview, March 16, 2018). Similar to H3, the level of RMD is assumed to correspond to the level of actual risk management for this hypothesis. Following this reasoning, the fourth hypothesis states:

H4: *There is a positive correlation between a company's RMD and EBIT.*

4.1.5 H5: Positive correlation between RMD and share price

The fifth hypothesis is concerned with examining the RMD level in relation to a company's share price. A previous study by Emm et al. (2007) argue that risk disclosure can create value by increasing transparency towards shareholders, which enable them to make informed decisions about the company's business. According to Lars Ragnar Vigdel, EY, there is a correlation between RMD and stock price, as an increased disclosure of risk in the annual report will result in better price-setting of the share price (L.R. Vigdel, personal interview, March 08, 2018). Clarke & Varma (1999) agrees by arguing that an integrated risk management approach allows companies to consistently deliver superior performance by managing risk more efficiently, which is reflected in their long-term stock prices. Furthermore, Linsley & Shrives (2000) argue that increased risk disclosure result in reduction of information asymmetry, which enhances the attractiveness of stock shares due to reduced costs of information gathering. Since Lam (2014) argues that annual reports are the main vehicle of communication with the company's stakeholders to disclose key information, one could expect that a company with an increased level of RMD in its annual reports to have an increase in share price. Therefore, the fifth hypothesis states:

H5: *There is a positive correlation between a company's RMD and share price.*

5 Methodology

The previous chapter introduced the hypotheses to be tested in this study. This chapter presents the methodologies applied in the analysis of testing the hypotheses, including regression analysis, index calculation, the RMDI, and the Disclosure Profile Index.

5.1 Linear regression

A linear regression approach is used in this study to analyse H4 and H5. A regression analysis is a statistical model that measures the characteristics of the relationships between multiple factors. The regression analysis explores the relationship between two variables through fitting a linear equation to the observed data (Johnson & Bhattacharyya, 2010). The two variables consist of a dependent variable y and an explanatory or independent variable x . The model is expressed by the following equation (Agresti & Finlay, 2014):

$$y = \alpha + \beta x \quad (1)$$

where,

- y is the dependent variable
- x is the independent variable
- β is the slope of the line
- α is the intercept

The underlying relationship between parameter α and β and the data points is called the linear regression model (Agresti & Finlay, 2014).

5.1.1 R^2 correlation coefficient

A statistical measure for the interpretation of a linear regression is the R^2 correlation coefficient. The R^2 gives an indication of the goodness-of-fit of a model by summarising how well the predicted data fits with the actual data (Agresti & Finlay, 2014). The measure can be interpreted as the proportion of total variation explained by the model. R^2 ranges between 0 and 1, where 1 indicates

that the regression predictions fit perfectly with the data and thus explains 100% of the variability in y (Moore, 2003).

5.1.2 Hypotheses testing of linear regression

Hypothesis testing is a method to test a prediction about a population that typically results from the theory driving the research (Agresti & Finlay, 2014). A hypothesis test is a significance test that uses data to summarise evidence about the specific hypothesis to determine the significance of the results. Specifically in the setting of linear regression, a hypothesis test explores whether there is a significant linear relationship between the independent variable x and the dependent variable y (Agresti & Finlay, 2014). Results are considered significant when the p-value is less than the significance level (Berenson, Levine, & Szabat, 2014). Thus, a p-value below the significance level indicates strong evidence for the results, while a larger p-value indicates weak evidence. A significance level is typically set at 0.01, 0.05 or 0.10 (Lacey, 1997). This study will perform the linear regressions and the corresponding hypothesis tests in Excel.

5.2 Index calculation

Index is a statistical device, which summarises a collection of data in a single base figure. This figure serves as a benchmark for measuring rate of change in the data over a period. Usually, the base is assigned a base value of 100 and all subsequent data is expressed in relation to this base. In this study, data is indexed when growth is of importance for the analysis. An indexed value with a base value of 100 can be obtained through the following equation:

$$INDX_t = \frac{Value_t}{Value_{t=1}} * INDX_{t=1}, \text{ where } INDX_{t=1} = 100 \quad (2)$$

where,

$INDX_t$ = indexed value in time t

Val_t = unindexed value in time t

$Value_{t=1}$ = unindexed value in time $t=1$

5.3 Risk Management Disclosure Index (RMDI)

In order to examine the research question and investigate the hypotheses, it is necessary to quantify the level of RMD in the annual reports. This may be challenging as information in annual reports mainly consist of qualitative data. This study measures and quantifies RMD by developing a disclosure index, referred to as RMDI. The method of using a disclosure index in a research was addressed by Cerf (1961), followed by additional studies including Singhvi & Desai (1971), Chow & Wong-Boren (1987) and Cooke (1989). Due to the extensive use of the method by previous research, Marston & Shrivs (1991) concluded such research technique to be valuable when investigating the topic of disclosure.

5.3.1 RMDI design

Since the RMDI forms the basis for the analysis in this study, it is essential to understand the underlying rationale of the structure of the index. As such, the design of the RMDI will be presented in this sub-section.

The RMDI consists of 12 KPIs covering 24 sub-KPIs that in total aim to provide a quantitative indication of the level of RMD in a given annual report. The full RMDI can be found in **Appendix 1**. The selected 12 KPIs are derived from the literature review in chapter 2, arguing why these are the most appropriate proxies of 'leading practice' of RMD. Chow & Wong-Boren (1987) argue that the selection of KPIs is generally developed from a review of relevant literature. However, all mandatory disclosures should be omitted from the index (Firth, 1980). Thus, as this study only considers voluntarily disclosures of risk management, all required risk disclosures are eliminated from the RMDI. As outlined in section 3.3.2, financial risk disclosure is the only area of risk that is required under IFRS since 2007, which is why disclosure of financial risk is eliminated as a parameter in the RMDI.

The 12 KPIs in the RMDI are further categorised and divided into four aspects of RMD. Firstly, *Risk governance* (hereafter *RKGN*) is the governance approaches and frameworks associated with risk management. Secondly, *Proxy for the importance of risk management* (hereafter *PIRM*) represents the existing presence of words and sections associated with risk. Thirdly, the *Extent of risk management disclosure* (hereafter *ERMD*) represents the amount of disclosed information in

connection with risks. Lastly, *Strategy* (hereafter *STRG*) indicates a company’s ability to overcome the risks by deriving future objectives and strategies from the identified risks. The four aspects provides a clearer overview of the development and value creation in different dimensions within RMD. The aspects and the assigned KPIs are found in **Figure 9**.

Figure 9: Overview of the RMDI



Source: Own construction

Weighting the RMDI

A key consideration during the construction of the disclosure index was the weighting of the KPIs. Cooke (1989) argues that different groups of users assign diverse weights to certain KPIs. Consequently, this study follows this argument by not weighting the KPIs in the RMDI as readers of the annual reports comprise of stakeholders with different agendas. Based on the above argument, the RMDI was constructed as an unweighted index.

The remaining part of this section will outline the 12 KPIs together with their respective motivations from the literature review, indicating that these are the ‘leading practice’ factors for RMD. The order of the KPIs has no indication of importance.

RKN

1. Risk ownership

Beasley et al. (2005), Deloitte (2014), Dionne (2013) and Nocco et al. (2006) argue that ERM creates value for a company when management incorporates risk ownership into their

governance approach and delegate responsibility to a risk committee or a CRO. Therefore, risk ownership was selected as a KPI for risk governance.

2. Frequency of internal risk assessment

Findings from researches done by the Committee on Corporate Governance (2014), Deloitte (2015a) and Moles (2016) concluded that a mature risk management process should include risk assessment procedures on a continuous basis as risks are exposed to constant changes in circumstances. Thus, frequency of internal risk assessment was added as a KPI for risk governance.

3. Standardised risk management frameworks

COSO (2017) and RIMS (2011) identified the importance of applying risk management standards and frameworks in order for a company to successfully manage risks within a fixed risk appetite. As such, the number of standardised risk management frameworks applied in the company was selected as the third KPI for risk governance.

PIRM

4. 'Risk'-to-report-length-ratio

A key assumption underlying previous research in quantitative content analysis is that the quantity of disclosure within a category indicates the importance of that category (Deegan & Rankin, 1996; Gray, Kouhy, & Lavers, 1995; Krippendorff, 2008). Thus, the word 'risk' is counted as a proxy for the importance of risk management. However, as annual reports are different in lengths, such a measure needs to be relative to the length of the report.

5. Risk section

Deloitte (2015a), OECD (2015) and Solomon et al. (2000) argue that top management should identify all types of risks exposed to the company and disclose these to the users of financial statements in a comprehensive and detailed manner. Therefore, disclosing a risk section in the annual report was selected as a proxy for a company's focus on identifying risks.

6. Risk management section

Nocco et al. (2006) argue that companies who view risks collectively, and not only on an individually and decentralised basis will create effective risk management and develop a long-run competitive advantage. Additionally, Moles (2016) found that it is not enough to

simply identify risks, but companies should also measure their impact and develop actions to manage those risks. Hence, having a separate risk management section in the annual report was chosen as a KPI to represent the importance of risk management.

ERMD

7. Frequency of risk management disclosure

Emm et al. (2007) found that risk disclosure is value adding for a company by increasing market confidence from improved transparency, as well as for shareholders by enabling them to make informed decisions about the business. Therefore, frequency of RMD was added as a KPI as it is argued that more value will be created, the more frequent the company discloses risks.

8. Types of risks disclosed

Deloitte (2015a) defines a mature level of risk management as one that includes all risks with a possibility of interrupting the business, whereas a less mature level only would focus on financial risks. BDO (2017) and Rudloff & Schultz (2016) identified the top risks in the oil industry to be: financial risk, regulatory risk, environmental risk, safety risk, cybersecurity risk, reputational risk and political risk. As such, the inclusion of risk types in the oil industry in annual reports was added as a KPI for extent of risk disclosure.

9. Potential risk impacts

Moles (2016) emphasises the importance of measuring risk in order to make strategic decisions and make appropriate course of actions. Therefore, disclosing the potential impacts of risks was selected as a KPI. Additionally, since all risks will have a financial impact eventually, companies should focus on managing their operational risks as there will be less financial consequences if these are managed appropriately (L.R. Vigdel, personal interview, March 08, 2018). Therefore, a non-financial-financial risk impacts ratio was added as an extended observation of this KPI.

STRG

10. Risk mitigation

Deloitte (2015b), Moeller (2013) and Moles (2016) present recommendations that companies should develop risk response strategies for each identified risk in order to fit them into the company's risk appetite. According to Lars Ragnar Vigdel, EY, companies should outline key risks in the annual report and explicitly tell the reader how to mitigate them, rather than disclosing risks without a clear management strategy (L.R. Vigdel, personal interview, March 08, 2018). For this reason, the proportion of disclosed risks that have mitigation strategies disclosed in the annual report is a significant proxy for risk management. Additionally, by the same reasoning from Lars Ragnar Vigdel as in KPI 9, a non-financial-financial risk mitigation ratio was added as an extended observation of this KPI (L.R. Vigdel, personal interview, March 08, 2018).

11. Short-term strategies

Deloitte (2015a) suggests that companies should embed risk in their strategic planning and goal setting. Botosan (1997) and Lang & Lundholm (1996) present findings that management demonstrate confidence in their ability to set better strategies when they disclose greater amount of risks, as they signal a better understanding of them. Linsley & Shrides (2000) argue that the annual report should be forward looking, as stakeholders should be aware of the company's outlook in order to be able to assess and manage their position in the company along with their own risks. Therefore, disclosing short-term strategies was selected as KPI for strategy.

12. Long-term strategies

In addition to the findings from literature supporting KPI 11, some existing literature have addressed a more long-term approach of the link between strategies and risk management. Deloitte (2015a) describes a mature future outlook statement as one with clear linkages to strategic objectives beyond a 12-month horizon. As mentioned in KPI 11, Botosan (1997) and Lang & Lundholm (1996) found that by disclosing a greater amount of risk, management demonstrates confidence in the ability to manage future risks, which means that they can set better long-term strategies by understanding their risks. Therefore, disclosing long-term strategies was selected as KPI for strategy.

5.3.2 Score-setting of the RMDI

The score-settings in the RMDI is not identical for all 12 KPIs as they are of different natures. What is common for all scores is that they are based on an absolute scale, implying that all scores are given based on the characteristics of the annual reports and not relative to each other or other factors. Additionally, within each KPI, the highest score indicates 'leading practice' of RMD, whereas a lower score indicates less good practice. In this study, the scoring methods of the KPIs are categorised into the following three groups:

1. *Count scoring*: Score-setting by simply counting the number of observations in a report. This scoring method is adapted in cases when the absolute amount of an element is of importance. This score is expressed as:

$$Score_t = \# Count_t \quad (3)$$

2. *Ordinal scoring*: Score-setting on a scale between zero (not disclosed) and a positive value, k ('leading practice'). The score is based on the characteristics of the KPI in the annual report and how it matches the description of the respective values on the score scale. This is the most commonly used method in the RMDI, as most of the KPI's are being categorised into degrees between *not disclosed* and 'leading practice'. The score is expressed as:

$$Score_t \in N[0; k] \quad (4)$$

3. *Ratio scoring*: the score is calculated as the ratio between two values that factor into the KPI. This scoring method is adapted when the ratio between two components is meaningful, rather than the single component per se. The calculation is expressed as the following:

$$Score_t = \frac{Value_{1t}}{Value_{2t}} \quad (5)$$

The specific scoring method and criteria are described in **Table 1** below. The complete RMDI can be found in **Appendix A**.

Table 1: Overview of score-setting of the 12 KPIs in the RMDI

KPI	Scoring method	Description
1. Risk ownership	Ordinal $Score_{1t} \in N[0; 3]$	0 = No information of any risk delegated position. 1 = A formal delegation of authority structure exist, but no risk department appointed. 2 = A formal delegation of authority structure exist in form of a risk board/committee. 3 = A formal delegation of authority structure exist in form of a risk board/committee, and/or a Chief Risk Officer (CRO) has been appointed.
2. Frequency of internal risk assessment	Ordinal $Score_2 \in N[0; 3]$	0 = Not reported. 1 = Less than quarterly or on an unspecified basis. 2 = Quarterly or bi-monthly. 3 = Monthly or more frequently.
3. Standardised risk management frameworks	Count $Score_3 = \#implemented frameworks$	1 score is given per standardised risk management framework implemented in the organisation on the given year of the annual report.
4. 'Risk'-to-report length-ratio	Ratio $Score_{4t} = \frac{\#risk'}{\#pages}$	The ratio between counts of the word 'risk' and number of pages in the annual report.
5. Risk section	Ordinal	0 = No section.

	$Score_{5_t} \in N[0; 2]$	1 = Gathered in a sub-section. 2 = Gathered in a main section ² .
6. Risk management section	Ordinal $Score_{6_t} \in N[0; 2]$	0 = No section. 1 = Sub-section. 2 = Separate section ³ .
7. Frequency of risk management disclosure	Ordinal $Score_{7_t} \in N[1; 3]$	This KPI is based on information on risk obtained from scanning the annual and interim reports on inclusion of risk management. 1 = Annually. 2 = Semi-annually. 3 = Quarterly.
8. Types of risk disclosed	Ordinal $Score_{8_t} \in N[0; 24]$	Measure the existence and importance of the following the risks identified in section 3.3.1: strategic, operational, regulatory & legal, cyber, reputational, environmental, safety and political risk. Each risk is scored based on a scale between 0-3, which together contributes to a maximum score of 24 for this KPI. 0 = Not included. 1 = Mentioned in annual report. 2 = Own sub-section. 3 = Own separate section.
9. Potential risk impacts	Ordinal $Score_{9_t} = \#potential\ impacts$	Score is given by counting the potential impacts imposed by the risks exposed to the company. The impacts are split up in financial and non-financial impacts for the sake of the analysis. The score is the sum of these two types.

² Main section is applied, when the section appears in the table of contents in the annual report.

³ Separate section is applied, when the section appears in the table of contents in the annual report.

		<p>0 = None included.</p> <p>1 = 1 – 20.</p> <p>2 = 21 – 40.</p> <p>3 = 41 – 60.</p> <p>4 = >61.</p>
10. Risk mitigation	<p>Ratio</p> $Score_{10t} = \frac{\#mitigations}{\#potential\ impacts}$	Score is calculated as the ratio between disclosed countermeasures to mitigate the potential impacts (as disclosed under KPI 9) and the real value from KPI number 9.
11. Short-term strategies	<p>Ordinal</p> $Score_{11t} = \#short - term\ strategies$	<p>Score is given by counting the number of short-term strategies within a 12-month horizon⁴. This is done by word-searching the annual reports of the following key words: <i>short-term, goal, ambition, aim, strategy, and objective</i>, followed by an assessment of whether the specific objective qualifies for a count.</p> <p>0 = None included.</p> <p>1 = 1 – 2.</p> <p>2 = 3 – 4.</p> <p>3 = 5 – 6.</p> <p>4 = >7.</p>
12. Long-term strategies	<p>Ordinal</p> $Score_{12t} = \#long - term\ strategies$	<p>Score is given by counting the number of long-term objectives beyond a 12-month horizon⁵. This is done by word-searching the annual reports of the following key words: <i>long-term, goal, ambition, aim, strategy, and objective</i>, followed by an assessment of whether the objective qualifies for a count.</p>

⁴ When time horizon is not specified, the strategy is assumed to be a long-term objective.

⁵ When time horizon is not specified, the strategy is assumed to be a long-term objective.

		<p>0 = None included.</p> <p>1 = 1 – 10.</p> <p>2 = 11 – 20.</p> <p>3 = 21 – 30.</p> <p>4 = >31.</p>
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Source: Own construction

5.4 Total RMDI absolute score indexation

The following equation is developed for H3 in order to eliminate biases from differences in score ranges among the 12 KPIs when analysing the total score in the RMDI. The following equation has been adapted to index a company’s attained score to the maximum and minimum values within each KPI, represented by identical ranges of 0-1. Thus, the maximum total score after indexation is 12.

$$ASINDX_{it} = \sum_{a=1}^{12} \frac{KPI_{it}^a - \min(KPI^a)}{\max(KPI^a) - \min(KPI^a)} \quad (6)$$

where,

- $ASIND_{it}$ = total score after indexation for company i in year t
- KPI_{it}^a = absolute score for KPI a for company i in year t
- $\max(KPI^a)$ = the highest possible score to attain in KPI a
- $\min(KPI^a)$ = the lowest possible score to attain in KPI a

5.5 Total score growth indexation

Following a similar reasoning as **Equation 6**, the following equation is developed to eliminate potential bias from differences in score ranges when analysing the *growth* in total score across the entire RMDI. Thus, the total score is indexed in order to recognise the degree of development. A company’s total score growth indexation at index 100 is obtained through the following equation:

$$SGINDEX_{it} = \frac{1}{12} \sum_{a=1}^{12} \frac{KPI_{it}^a}{KPI_{it=2007}^a} * SGINDEX_{it=2007}, \text{ where } INDEX_{it=2007} = 100 \quad (7)$$

where,

- $SGIN_{it}$ = indexed score growth for company i in year t
- KPI_{it}^a = absolute score for KPI a for company i in year t

5.6 Disclosure Profile Index

Based on the RMDI, an extended index is developed for the analysis of H2, so called *the Disclosure Profile Index*. There are certain methodological issues that need to be clarified in connection with this index explained in the following section.

As mentioned in section 5.3.1, this study has identified four aspects of RMD: RKN, PIRM, ERMD and STRG. The purpose of this index is to observe the relations between companies' scores for each aspect and observe the characteristics of their RMD in terms of the four aspects compared to each other. The highest and lowest possible scores to obtain for each KPI are presented in order to construct the Disclosure Profile Index. However, as some KPIs are not limited within a range, the highest and lowest scores will then equal the minimum and maximum scores the sample companies have attained. To index the four indices of the aspects, the following equation has been adopted:

$$IND_{it}^D = \frac{1}{3} \sum_{a=1}^3 \frac{KPI_{it}^a - \min(KPI^a)}{\max(KPI^a) - \min(KPI^a)} \quad (8)$$

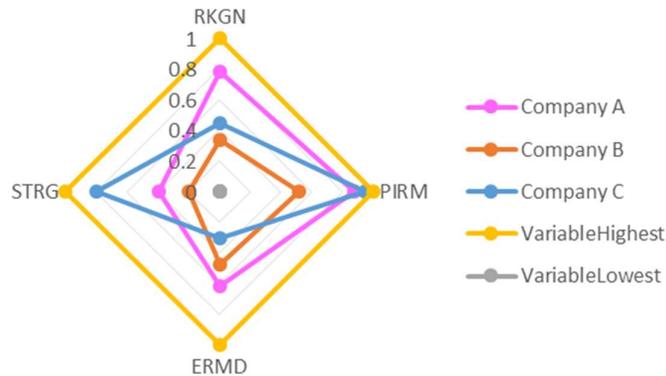
where:

- IND_{it}^D = standardised index for company i for aspect D in year t
- KPI_{it}^a = absolute score for KPI a for company i

The index obtained through the equation will be a value between 0 and 1, with 0 being the lowest possible score to attain in the given aspect and 1 the highest. The Disclosure Profile Index is intuitive as it visualises a comparison of the companies in all four aspects in the given year and place them relative to each other and to the highest and lowest scores.

The four indices obtained in the four aspects will be depicted in a graphical illustration, which demonstrates the characteristics of the RMD of each company. The graph consists of four axes representing the four aspects, each with a maximum value of 1. A RMD profile is obtained by connecting the points of scores obtained by each company in the four aspects.

Figure 10: The RMD profile diagram, in year n



Source: Own construction

The illustration captures the companies' RMD profiles and benchmark their scores in the four aspects to each other in the given time. **Figure 10** demonstrates that Company B possesses the weakest RMD profile, scoring low in all four aspect, whereas Company C shows a skewed RMD profile, scoring high on both PIRM and STRG and low on the other two aspects.

6 Data

The previous chapter outlined the methodologies used in the analysis of this study, which establishes the frame for which types of data to be collected. As such, this chapter provides a clarification of the data gathering process that was conducted in order to carry out the research in this study. The data used as input for the RMDI, the micro- and macroeconomic data for the analysis, and the semi-structured interviews for expert input will be outlined. Finally, the chapter will end by discussing the validity of the data collected.

6.1 Data collection

The empirical analysis is built upon data of four natures. The first is qualitative and quantitative information used for the RMDI as disclosed by the sample companies in the annual reports. The second type of data is microeconomic data in form of company financials and share prices. The third type of data is macroeconomic data in the form of oil prices. These two types of data are both extracted from the financial platform Datastream. Lastly, qualitative information is gathered through semi-structured interviews with subject matter experts. The data collection methods are described in the following sub-sections.

6.1.1 Annual reports

The data input for the RMDI were derived solely from companies' public annual reports, available for download from each company's website. In order to provide competent and comparable data input for the RMDI, annual reports for all sample companies over the 10 year period were thoroughly examined. Interim reports were only partially scanned for the purpose of information on frequency of RMD used in the index. Annual reports were also inspected for reconciliation purposes of the data extracted from Datastream.

Other manually extracted data from the annual reports are the effects of oil prices. The effect on a company's financial position caused by fluctuations in oil prices is considered as a financial risk. As mentioned in section 2.5.1, IFRS 7 requires the sample companies to disclose the effect of volatility in commodity prices in their annual reports. Thus, all sample companies have disclosed the effect from crude oil prices imposed on their financials through sensitivity analyses in the annual reports, which formed the basis for the oil price adjustment. This is outlined in section 6.1.4.1.

In total, the following types of information were extracted from annual reports:

- Qualitative information, used for scoring of the RMDI
- *Earnings before interest and taxes* (hereafter *EBIT*), used for validating data extracted from Datastream
- Crude oil price effect through companies' sensitivity analysis, used for normalising EBIT

6.1.2 Datastream

For the purpose of the analysis, oil prices, various financial metrics and share prices were extracted from Datastream. The first two types of data were downloaded in the time span between 1 January 2007 to 31 December 2016. Oil prices were downloaded on weekly basis, while the financial metrics were extracted on annual basis to match the 10 data points from the RMDI, i.e. the 10 years analysed. Share prices were collected in the time span between 1 January 2007 to 30 June 2017 on weekly basis. The extracted data was transferred into Excel sheets for further analysis.

The following types of information were extracted from Datastream:

- *Market Value* (hereafter *MV*) of the sample companies as per 31 December 2016. This data is used for the selection of sample companies based on their market share, as will be further described in section 6.2.
- EBIT of the sample companies for each respective year in the analysed period 2007-2016. The financial metric is used for the analysis of H3 and H4.
- Share prices of the sample companies on a weekly basis for the period 1 January 2007 until 30 June 2017. This data will be used for the analysis of H5.
- Crude oil prices on weekly basis for the period 1 January 2007 until 30 June 2017. This information will be used to normalise the sample companies' EBIT in the analysis by eliminating effect from the oil price movements, as describe in section 6.1.4.1.

6.1.3 Interviews

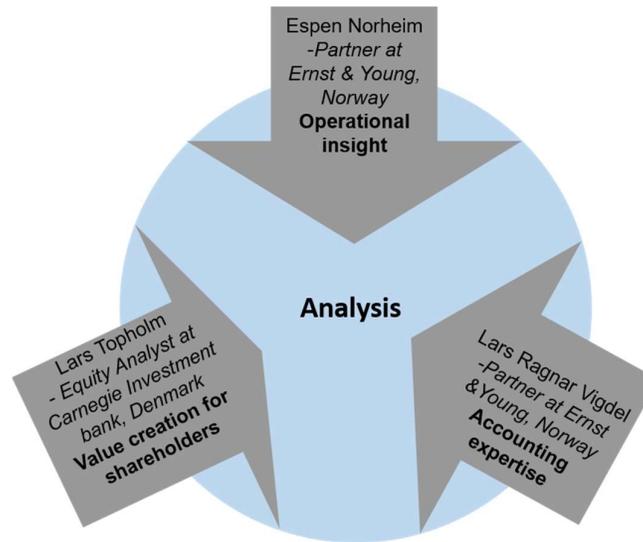
According to Hughes et al. (2006), interviews provide the possibility to uncover information that might not be available through other techniques such as questionnaires' and observations. Ho (2006) argues that interviews provides insight into interviewee's perceptions of the situation. Therefore, interviews are involved as a part of the data collection to uncover information and answer doubtful topics that are not fully exposed through literature. In this study, it was considered necessary to involve experts on the topic in order to understand the perceptions of RMD in Nordic oil industry, which the interviewees have gained from professional experience.

Three interviews were conducted with three subject matter experts to gain understanding of RMD in annual reports on a holistic level. All interviews were conducted through semi-structured

interviews as it provided the highest flexibility for follow-up questions while still keeping the discussions within the scope of the predetermined topic (Rugg & Petre, 2007). Two interviews were conducted over the telephone as both interviewees were located abroad, while the third interview took place in person at the interviewee's office. The two interviews conducted over the telephone were recorded, while the interview held in person was transcribed due to no available recording device at the time of the interview.

The first interview was held over the telephone with Espen Norheim, Partner in Transaction Advisory Services at EY, Norway. Norheim has 15 years of experience within operations, marketing, R&D and strategy in the International Oilfield Service sector. Consequently, Norheim has a deep understanding of the nature of the industry, which was the primary reason he was chosen as an interviewee to contribute with operational insight from the oil industry to this study. The second interview, also over the telephone, was held with Lars Ragnar Vigdel, Partner and head of Financial Accounting Advisory Services (FAAS) in Norway. Vigdel is a State Authorised Public Accountant at EY and has previously worked as Chief Accountant for Accounting Policies in Statoil for nine years. Vigdel contributed with valuable insight to this paper in terms of technical expertise in accounting treatments in the oil industry and how regulations on risk disclosure have developed over the historical years. The third interview took place in person with Lars Topholm, equity analyst at Carnegie Investment Bank in Denmark. As an equity analyst for over 20 years, Topholm has reviewed uncountable annual reports from which he has made his initial stock recommendations to clients immediately after publication of these annual reports. Brown, Call, Clement, & Sharp (2015) found that industry knowledge is the most valuable input that equity analysts contribute by their close relationships with CEOs and CFOs. Therefore, Topholm is believed to be a valid source that represents the most 'sophisticated users', professional investors, for a public company by understanding what adds value for a company's shareholders. The interviewees represent three important stakeholders of public companies' annual reports in the Nordic oil industry and are thereby considered to be qualified to bring their unique insights to this study, as illustrated in **Figure 11** below.

Figure 11: Illustration of the interviewees and their contributions to this study



Source: Own construction

The interviews were conducted in a semi-structured manner, where relevant questions for the research were prepared in advance within each of their areas of expertise. Several ad hoc follow-up questions on further elaborations were asked throughout the sessions. The interviews were either documented as recordings or a transcribed. The transcribed interview with Lars Topholm is found in **Appendix I**. When using the data collected, the documented interviews were replayed, re-read and analysed by searching for key words relevant for the study, depending on the interviewees' expertise areas. By re-visiting the interviews, valuable information were noted, analysed and sourced. An outline of the characteristics of each interviewee and their interviews are found in **Appendix H**.

6.1.4 Data validity

Despite the comprehensiveness of the collected data, there are some important limitations to acknowledge which are outlined in this section. Data validity assures that the results found in the research are reliable and realistically represented.

6.1.4.1 Normalisation of EBIT

For the benefit of H3 and H4, EBIT will be normalised from oil price effects. The reason for normalising the companies' respective EBIT is due to oil prices affecting companies to different extents. Three elements are required for the normalisation calculation:

1. Companies' EBITs throughout the period 2007-2016, extracted from the financial data platform Datastream.
2. Effect of fluctuation in oil prices on the company's EBIT, manually extracted from the companies' annual reports.
3. Actual crude oil price, extracted through Datastream.

Based on the extracted data, a normalised EBIT in the given year t is obtained through the following equation.

$$EBIT_{t_{norm}} = EBIT_{t_{disclosed}} - (COP_t - COP_{t-1}) * EBITEFF_{t_{COP}} \quad (9)$$

where,

- $EBIT_{t_{norm}}$ = normalised EBIT in year t
- $EBIT_{t_{disclosed}}$ = disclosed EBIT in the annual report in year t
- COP_t = average crude oil price in year t
- COP_{t-1} = average crude oil price in year $t-1$
- $EBITEFF_{t_{COP}}$ = unit effect on EBIT imposed by fluctuation in crude oil price

An example of this calculation can be found in **Appendix E**.

By normalising EBIT, the greatest bias factor was removed and the effect of RMD was therefore further isolated. However, oil prices are not the only factor that brings noise to this analysis and one could further normalise EBIT by removing effects from currency volatilities, gas prices etc. However, due to data and time limitations to this study, such adjustments have not been performed. As oil price is assumed to have the most significant influence on the selected companies' operational profit, it was the only effect adjusted from EBIT.

6.1.4.2 Errors and biases

The data for this research was collected for the purpose of representing the true foundation for the analysis. Quantitative data, extracted from Datastream and annual reports, is to some extent exposed to some errors and biases that need to be acknowledged.

Although Datastream is expected to report identical financial metrics as disclosed in the companies' annual reports, there were certain cases where these numbers did not match. The reason for this could be due to later adjustments by the company or simply an error from Datastream. In such cases, financial metrics from the annual report were used. Annual reports were used for the quantification of companies' RMD in the RMDI. Each KPI has descriptions and decision rules for its scores as mentioned in section 5.3.2. However, during the process of assigning scores, subjective evaluations were used in cases where a decision could not be made objectively based on the fixed descriptions and decision rules. In such cases, a bias may occur from the subjective assessment, which may create bias for the overall data. To the best of their ability, the authors have standardised any subjective assessments during cases of uncertain situations.

6.2 Population and sample size

As mentioned in section 1.4.2, the population of this study consists of Nordic oil companies that are listed on stock exchanges during the analysed period 2007-2016. Following the described criteria, a total of 13 companies met the population requirements based on information extracted from Datastream. Findings by Linsley & Shrivs (2006) present a strong correlation between the level of disclosure in annual reports and company size. As such, the largest companies in the population were selected as sample companies as they were believed to represent the highest level of disclosure.

The selection process of the sample companies was based on market values as per 31 December 2016, which is defined as the total market value of the company's outstanding shares (Petersen & Plenborg, 2010). As a result, three companies were selected for the empirical analysis as they together represent 88% of the population. The three companies have been the largest by MV in the industry for the total analysed period and are represented by Statoil ASA (76%), Neste Oyj (13%), and Lundin Petroleum (9%) as per December 2016.

6.2.1 Sample companies

This sub-section outlines a summary of each company's profile and key information on their operations.

Statoil ASA

- Country: Norway
- Stock exchange: Oslo Stock Exchange (2001)
- Operating segment: Integrated

Statoil ASA (hereafter *Statoil*) was founded in 1972, and became listed on the Oslo Stock Exchange (Norway) and New York Stock Exchange (US) in June 2001 (Statoil ASA, 2018a). Statoil reported according to US GAAP up until 2007, where they changed reporting standards to IFRS (L.R. Vigdel, personal interview, March 08, 2018). Furthermore, in October 2007, Statoil engaged in a merger with Hydro's oil and gas division and became the world's largest offshore operator. Today, Statoil is among the world's largest suppliers of oil and gas and is owned 67% by the Norwegian state. Statoil operates in over 30 countries involved in upstream, midstream and downstream activities within oil and gas and has invested in renewable energy since 2008 (Statoil ASA, 2018a). Although, oil remains the company's major source of revenue (Statoil ASA, 2016).

Lundin Petroleum

- Country: Sweden
- Stock exchange: Stockholm Stock Exchange (2001)
- Operating segment: Upstream

Lundin Petroleum (hereafter *Lundin*) was established in 2001 after an acquisition by Canadian independent Talisman Energy. The original company stems from the Lundin family and has operated with upstream oil exploration and production since 1981. Lundin operates within the upstream segment, i.e. exclusively with exploration and production of petroleum and holds its main activities in Norway and South East Asia (Lundin Petroleum, 2018b).

Neste Oil

- Country: Finland
- Stock exchange: Helsinki Stock Exchange (2005)
- Operating segment: Downstream

Neste Oil (Hereafter *Neste*) was established under the name Neste Oy in 1948 to secure the supply of oil in Finland. The company operates in the downstream sector and focuses on their high quality products while holding a strong position in the Baltic Sea region. Although Neste is the only oil company in the world having self-produced premium quality renewable fuels, oil remains the largest revenue source (Neste Oil, 2016, 2018b).

7 Analysis and results

This chapter will present the empirical analysis of the sample companies by investigating the hypotheses developed in chapter 4. As addressed in section 4.1, the five hypotheses are divided into two aspects of the research: the development in RMD in the analysed period and whether RMD is value creating. The analysis is carried out through both descriptive and regression analysis. **Table 2** presents the respective aspect and analysis method for the five hypotheses. The analysis of the hypotheses are presented in the remainder of this section, accompanied by interim conclusions at the end of each section.

Table 2: Overview of hypotheses, aspects and methods

		H1	H2	H3	H4	H5
Aspect of the research question	Development in RMD	X	X			
	Value creation of RMD			X	X	X
Analysis method	Descriptive	X	X	X		
	Regression				X	X

Source: Own construction

7.1 H1: Positive development in RMD

This analysis is set out to investigate the verification of the first hypothesis: *There is a positive development in RMD among companies in the analysed period.*

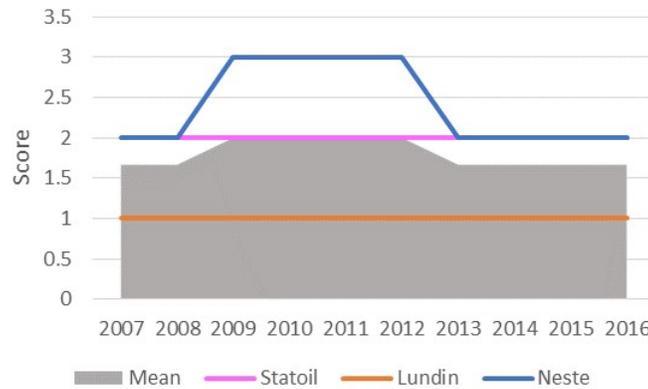
The analysis aims to reveal developments in RMD in the population by examining the RMDI through a descriptive analysis. The RMDI is examined on three levels: single KPI level, aspect level, and total RMDI level. The aim is to gain a fundamental understanding of the development of each respective KPI before analysing developments on a holistic level. The single KPIs are analysed based on their absolute scores in the RMDI since the scores directly reflect the characteristics of the companies' RMD. As such, the drivers behind the KPI scores are meaningful to examine in order to understand the development of RMD. On the contrary, the analysis on the aspect and total RMDI levels are based on indexed scores, as the total absolute scores are not significant per se, as the growth is of importance. The respective approaches and analyses for the three levels are presented in the following sections.

7.1.1 Single KPI level

This sub-section will analyse the 12 KPIs and their developments in scores in the RMDI throughout the analysed period. For each KPI, a descriptive analysis is carried out based on the scores in the RMDI and the qualitative information that serves as basis for the scores. The companies' scores in the RMDI are disclosed in **Appendix F**. The descriptions of the score-setting for each KPI is found in **Table 1** in section 5.3.2. Furthermore, descriptive statistics summarise the development patterns of the KPIs at the end of this section. Below follows the analysis of the 12 KPIs.

KPI 1: Risk ownership

Graph 1: KPI 1: Risk ownership scores, 2007-2016

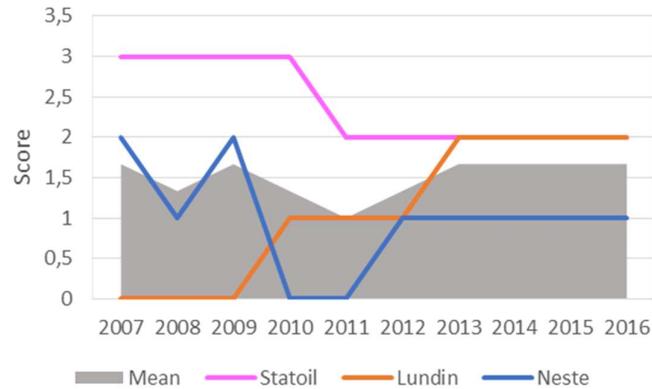


Source: Own construction

KPI 1 quantifies the structure of a company’s risk ownership on a range between 0-3. Throughout the examined period, it is evident that both Statoil and Lundin have maintained their structures of risk ownerships on a constant level throughout the years. Statoil discloses that risk management is managed by a Corporate Risk Committee directed by the CFO. Lundin reports that risk management was delegated to the President and the CEO up until 2010, after which it was reported to the board through an Audit Committee from 2011 and onwards. Although the authority of risk management has shifted to a board after 2011, the lack of a specific risk committee restrain Lundin from receiving a higher score. Neste followed a similar pattern as Statoil, except for reaching a temporary higher score in 2009-2013 as a CRO was temporarily appointed, causing a rise in score. According to the annual reports, Neste possesses a well-structured risk governance throughout the decade, where risk assessment and risk management have been integrated in the company with a clear delegation of authority is in place. Overall, all three companies maintained the same scores at the beginning of the analysed period as in the end. Hence, it can be perceived that the development in this KPI has been constant.

KPI 2: Frequency of internal risk assessment

Graph 2: KPI 2: Frequency of internal risk assessment scores, 2007-2016



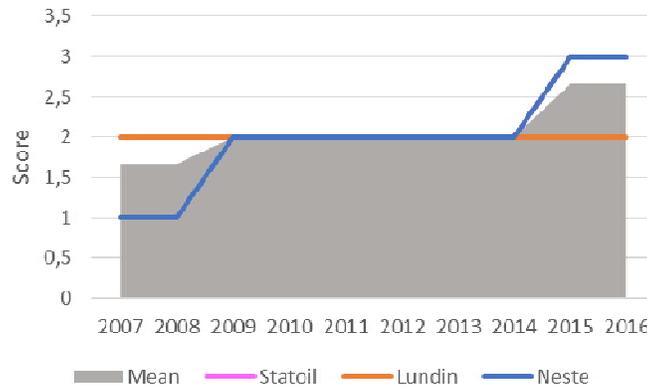
Source: Own construction

KPI 2 quantifies the frequency of internal risk assessment disclosed in the annual reports, which is defined on a scale of 0-3. According to the annual report, Statoil has gradually reduced its frequency of internal assessment from monthly basis in 2007 to minimum five times a year in 2016. Lundin's development in internal risk assessment has moved in the opposite direction by gradually increasing from no disclosure in 2007 to disclosing a risk assessment process executed on quarterly basis in 2016. Neste presents a more fluctuating pattern in the frequency of risk assessment, covering three different scores over the analysed period. Hence, Neste's score fluctuates greatly with no obvious pattern.

Although the three companies' scores have developed differently, all companies have disclosed a frequency of internal risk assessment in their annual reports that vary between semi-annually to five times a year by 2016. By looking at the mean score illustrated by the grey area in the graph, it is evident that the development in this KPI has been kept on a constant level. However, the spread between the data points has decreased significantly between 2007-2016, indicating that companies have become more similar on this KPI in the annual reports.

KPI 3: Standardised risk management frameworks

Graph 3: KPI 3: Standardised risk management frameworks scores, 2007-2016



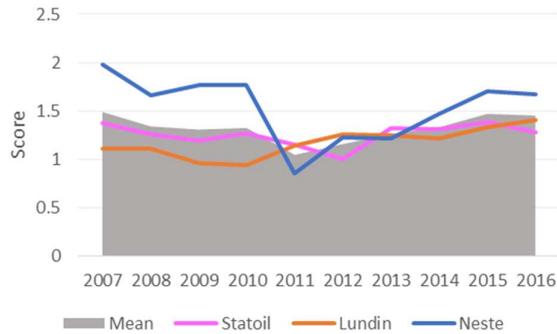
Source: Own construction

KPI 3 represents the number of standardised frameworks implemented by the companies to support risk management. Overall, the companies have disclosed implementation of the following standard frameworks: COSO, ERM and ISO 31000. Descriptions of these frameworks are outlined in section 2.4. Statoil is not visible in **Graph 3** as it follows similar patterns as the other companies. Statoil has implemented COSO and ERM throughout all years and added ISO 31000 in 2014, increasing the score to 3. For the analysed period, Lundin applied COSO and a self-constructed standardised methodology that assesses risks based on likelihood and impact. Neste experienced most development in this KPI, with only ERM in place in 2007 before adding COSO in 2009, followed by ISO 31000 in 2015.

In the examined period, the average development of implemented standardised frameworks for risk management among the three companies has increased from having one or two standards implemented in 2007 to two or three in 2016.

KPI 4: 'Risk'-to-report-length-ratio

Graph 4: KPI 4: 'Risk'-to-report-length-ratio scores, 2007-2016

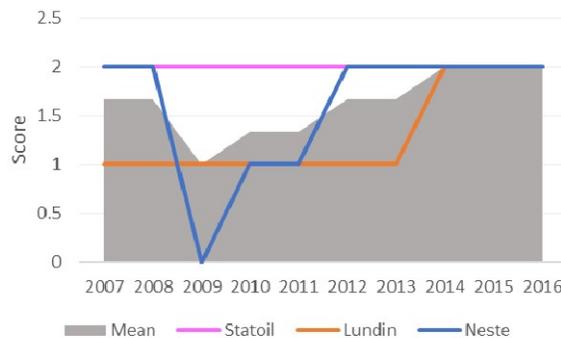


Source: Own construction

KPI 4 measures the ratio between the amount of times the word 'risk' appears in the annual report and the length of the rapport to provide a proxy for the significance of risk. The development in this KPI is steady for Statoil and Lundin throughout 2007-2016, who show similar patterns. Neste appears to have disclosed more risk-related content in both the beginning and the end of the 10 year span, while less around 2011-2013 with approximately 38% less use of the word in their 2011 annual report. In general, the development of the mean in this KPI appears to be constant.

KPI 5: Risk section

Graph 5: KPI 5: Risk section scores, 2007-2016



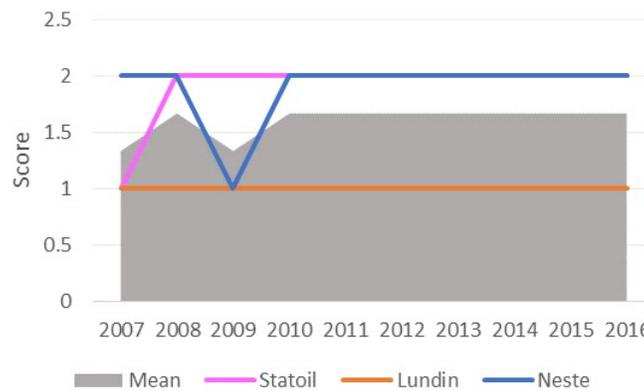
Source: Own construction

KPI 5 quantifies whether a company's risks are outlined in a separate section in the annual report. As illustrated in **Graph 5**, Statoil has maintained a score of 2 throughout the entire period indicating that risks have been outlined in a separate section in the annual reports. Lundin addressed its risks in a sub-section between 2007-2013, after which all risks were identified in a separate section. Neste's score swings greatly throughout the analysed period with risks outlined in a separate section during 2007-2008, followed by a total absence from the report in 2009. However, risks were addressed in a sub-section the following two years until assigned a separate section, yet again, in 2012.

As observed in **Graph 5**, all the sample companies outlined their risks in a separate section after 2014, indicating a consensus of the importance to gather all risks in a separate section. The general trend of this KPI is considered to be positive, based on the mean score illustrated by the grey area.

KPI 6: Risk management section

Graph 6: KPI 6: Risk management section scores, 2007-2016



Source: Own construction

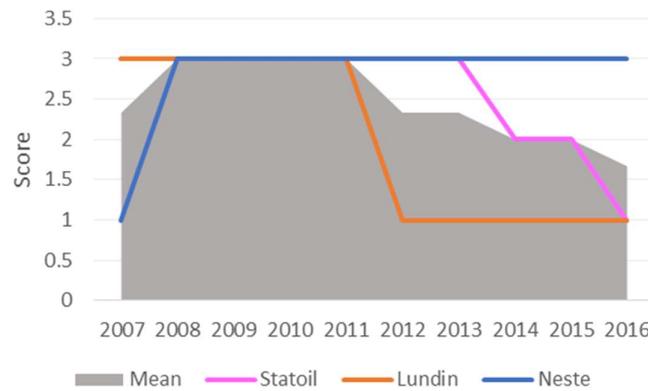
KPI 6 quantifies whether a company's risk management is addresses in a stand-alone section in the annual report. Statoil outlined risk management in a sub-section in the very beginning the analysed period, before assigning it a separate section. On the contrary, Lundin maintained risk

management in a sub-section throughout the entire analysed period. Meanwhile, Neste addressed risk management in a separate section throughout the entire period with the sole exception of 2009, where the company merely disclosed risk management in a sub-section.

Overall, the KPI shows a stable development throughout the years.

KPI 7: Frequency of risk management disclosure

Graph 7: KPI 7: Frequency of risk management disclosure scores, 2007-2016

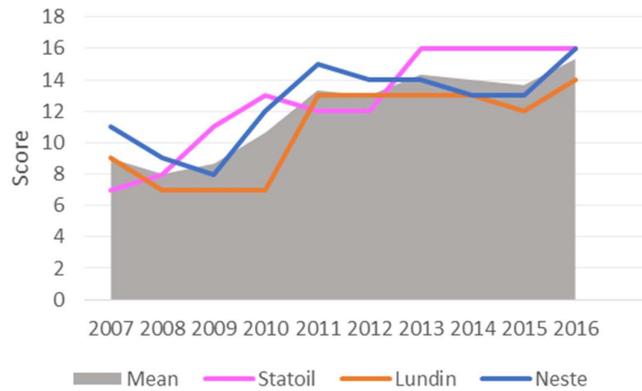


Source: Own construction

KPI 7 quantifies the frequency of RMD by scanning annual and interim reports. Statoil shows a decrease in score during the final years as a consequence of gradually reducing the frequency of RMD from quarterly between 2007-2013 to semi-annually in 2014-2015, and finally merely annually by 2016. A similar trend is observed for Lundin, who disclosed risk management quarterly between 2007-2011, but thereafter reduced to annually from 2012 and onwards. Neste developed in the opposite direction as Statoil and Lundin by showing a development from disclosing annually in 2007 to quarterly in all the following years of the period. The development in this KPI shows mixed trends and the companies differ in that risk management is either disclosed annually or quarterly by 2016, making a common pattern hard to spot. Although, by observing the mean score, a negative trend is identified over the analysed period.

KPI 8: Types of risk disclosed

Graph 8: KPI 8: Types of risks disclosed scores, 2007-2016



Source: Own construction

KPI 8 quantifies both the types of risks disclosed and whether they are disclosed in stand-alone sections. Eight risks are measured under this KPI including: strategic, operational, regulatory, cybersecurity, reputational, environmental, safety and political risk. Based on whether these risks are only mentioned, assigned its own sub-section or a separate section, a score between 1-3 is delegated.

Statoil increased steadily in this KPI between 2007-2010, with reputational, safety and environmental risks as main drivers. During this period, reputational risk went from merely being mentioned to being assigned a sub-section in 2009. Environmental risk developed from being absent between 2007-2008, to being introduced in 2009 and subsequently acquired its own sub-section from 2010 and onwards. The same development was applied for safety risk, as Statoil's reports group environmental risk and safety risk together as Health, Safety and Environment (HSE). Statoil maintained a relatively stable score during 2010-2012 before a steep increase occurred in 2012. This increase was fuelled by two main causes. Firstly, operational risk altered from simply being mentioned to being addressed in a separate section from 2013 and onward. Secondly, cybersecurity was brought into the report in 2013 and immediately held its own sub-section. After 2013, the disclosure of the eight types of risks remained constant in Statoil's annual reports.

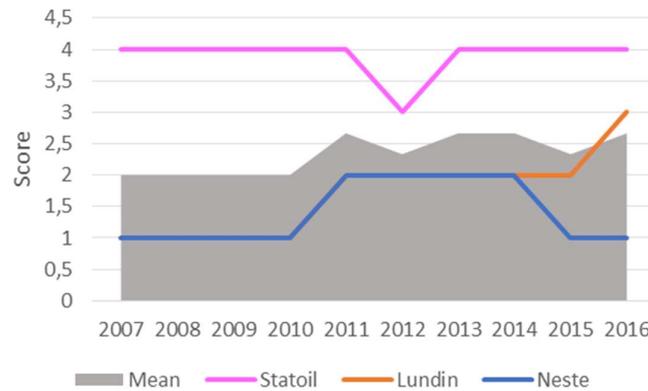
Lundin barely altered its score in the KPI between 2007-2010 aside from excluding environmental and safety in 2008-2010. However, the company's score doubled from 2010-2011 due to three main reasons. Firstly, strategic risk developed considerably from being absent in 2010 to being assigned a separate section in 2011. Secondly, operational risk upgraded from having a sub-section to a separate section during this period. Thirdly, environmental and safety risks reappeared in 2011 after three years of absence. After 2011, Lundin kept a relatively steady score, with the only noteworthy alteration being the inclusion of cybersecurity risk in 2015.

Neste took a slight dive in the beginning of the period between 2007-2009, as both strategic risk and operational risk declined from score 3 to 1, and cybersecurity risk went from being mentioned in 2007-2008 to total absent in 2009. However, the company's score increased significantly from 2009-2011, where strategic risk was assigned its own separate section, cybersecurity risk reappeared, reputational risk gained its own sub-section, and a whole chapter was dedicated to sustainability in the annual report, which included both environmental and safety risks. Neste maintained a relatively constant score from 2011 and onwards with a slight decrease due to a change in disclosure of cybersecurity risk disclosure, which was discarded in 2015, but was subsequently assigned a sub-section in 2016.

Overall, KPI 8 was most volatile between 2007-2011. From 2011 and onwards, the companies maintained stable scores apart from Statoil's and Neste's respective increases in 2013 and 2015 due to the inclusion of cybersecurity. The common trend over the analysed period for the three companies can be summarised by two key developments. Firstly, environmental and safety risks appear to play an increasing role throughout the years, evident by Neste dedicating a whole chapter to sustainability centred on the two risks. The second significant observation is cybersecurity risk showing increased importance in the annual reports. Neste already mentioned cybersecurity in 2007, while Statoil and Lundin introduced this risk in their annual reports in respectively 2013 and 2015. All three companies show similar trends in this KPI. The mean score evidently indicates a positive development throughout the analysed period.

KPI 9: Potential risk impacts

Graph 9: KPI 9: Potential risk impacts scores, 2007-2016



Source: Own construction

KPI 9 measures the number of risk impacts disclosed in the annual report. The scores are distributed on a scale of 0-4. Typical examples of potential risk impacts are disclosed in **Appendix B**.

Statoil disclosed between 55-78 impacts in the respective annual report throughout the analysed period, which is considered as a flat development as observed in **Graph 9**. Lundin gradually increased the score from 1 to 3, as the company increased its disclosed risk impacts from 13 in 2007 to 45 in 2016. This represents the most significant development among the three companies. Neste disclosed around 13 impacts in both the beginning and end of the period, although the disclosed impacts temporarily increased with 50% over between 2011-2014.

KPI 9a: Non-financial-financial risk impacts ratio

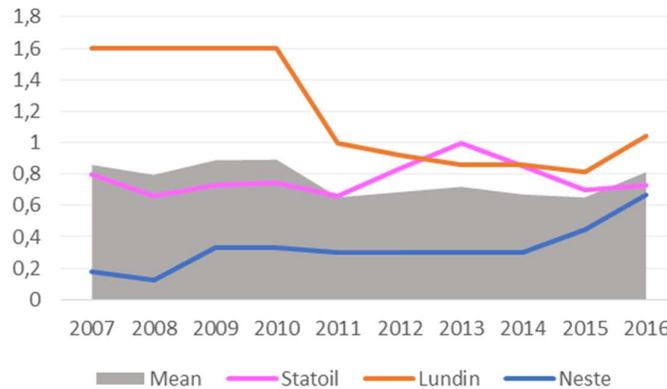
As an additional observation to this KPI, the disclosed risk impacts are split into financial and non-financial impacts, i.e. whether a risk imposes financial or non-financial impact on the company.

The ratio is obtained through the following equation:

$$ratio_{9a} = \frac{\# \text{ of non - financial impacts}}{\# \text{ of financial impacts}} \quad (10)$$

The typical examples for financial and non-financial impacts are disclosed in **Appendix B**.

Graph 10: KPI 9a: Non-financial-financial risk impacts ratio scores, 2007-2016



Source: Own construction

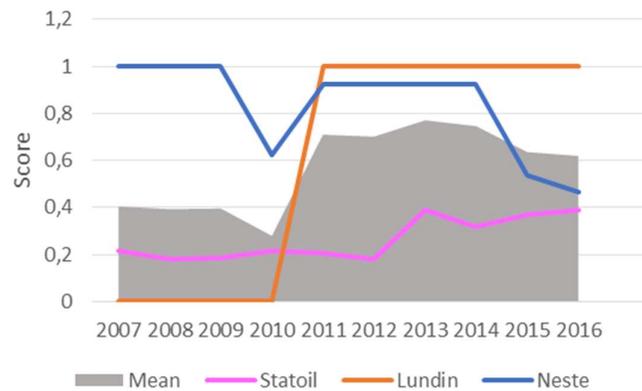
Graph 10 reveals that the proportion between financial and non-financial impacts have altered considerably for Lundin and Neste. Lundin disclosed a significantly large amount of non-financial impacts compared to its financial impacts in 2007, whereas the company developed towards a more equal distribution between the two after 2010. Neste, on the other hand, initially disclosed around a fifth of non-financial impacts compared to financial impacts, after which the company steadily developed towards a more balanced distribution between the two. Meanwhile, Statoil maintains stable in this KPI. Although the spread decreased significantly over time, the mean score suggests a stable development in KPI 9a. By the end of the analysed period, the three companies meet in a range between 0.67-1.05, with a mean of 0.81 indicating the amount of non-financial and financial disclosed impacts have come closer to a split of almost 1:1, despite the large spread in 2007. Thus, it appears that financial and non-financial impacts have somewhat similar importance by the end of the analysed period.

The three companies have developed steadily under KPI 9 with no significant fluctuations. The grey area in **Graph 9** demonstrates that a positive development is observed in this KPI throughout

the analysed period. By additional examination of KPI 9a, it is noteworthy that the proportion between non-financial and financial risk impacts have shifted significantly for Lundin and Neste, although in different directions. Thus the mean observation for this KPI is almost unchanged.

KPI 10: Risk mitigation

Graph 11: KPI 10: Risk mitigation scores, 2007-2016



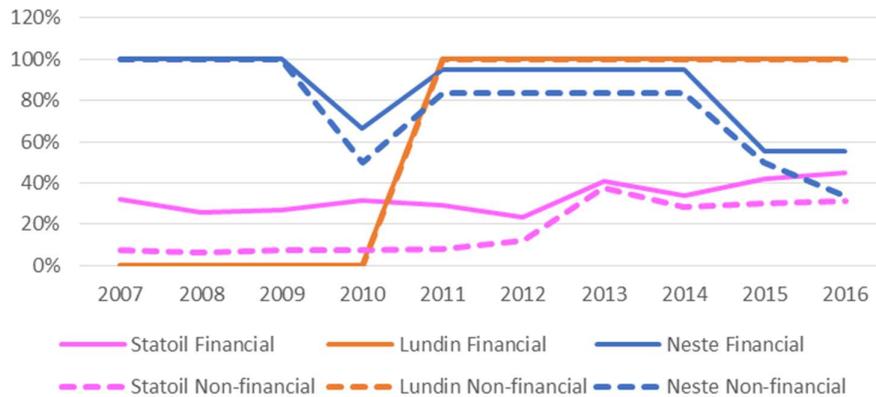
Source: Own construction

KPI 10 determines the ratio between disclosed impacts, as measured in KPI 9, and countermeasures disclosed to mitigate the risks.

Statoil maintained a steady but relatively low score level throughout the analysed period, indicating that the company outlines its risks and potential consequences without providing corresponding countermeasures on how to mitigate them. In contrast, Lundin developed rapidly and significantly in 2010. In the beginning of the period, Lundin merely outlined its risks and impacts without disclosing any mitigation approaches, whereas after 2010, 100% of the disclosed impacts had countermeasures. Neste developed in the opposite direction by providing mitigation strategies on 100% of its potential risk impacts during 2007-2009, to only disclosing countermeasures on 47% of the risks by the end of the analysed period.

KPI 10a: Non-financial-financial risk mitigation ratio

Graph 12: KPI 10a: Non-financial-financial risk mitigation ratio scores, 2007-2016



Source: Own construction

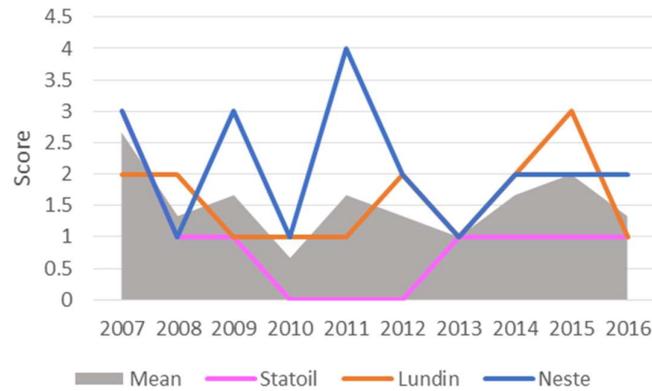
As an additional observation to this KPI, risk mitigations is split into mitigations for financial and non-financial risks. **Graph 12** illustrates the development for these two types of risk mitigation across the three companies. The graph indicates that although the development in both types of risk mitigation are somewhat synchronised for Statoil and Neste, a higher proportion of financial risks are mitigated as compared to non-financial risks. The potential reasoning causing this scenario will be discussed in chapter 8. Lundin, on the other hand, has the same proportion of mitigation for financial risks as for non-financial risks throughout the period analysed.

For KPI 10, the companies have developed in different sequences over the analysed period. Statoil only disclosed a small portion of its mitigation strategies towards its disclosed risks, for all years analysed. Meanwhile, Lundin started by disclosing zero mitigation strategies in 2007, to disclosing mitigations to 100% of its potential risk impacts by the end of the period. Neste reduced its disclosed mitigations from 100% to around 45% throughout the examined period.

Overall, the general observed trend across the companies is positive as the mean increased from 0.40 to 0.62 between 2007-2016. This indicates that the average development has gone from only disclosing mitigations strategies to 40% of the disclosed risks in 2007 to 62% in 2016.

KPI 11: Short-term strategies

Graph 13: KPI 11: Short-term strategies scores, 2007-2016



Source: Own construction

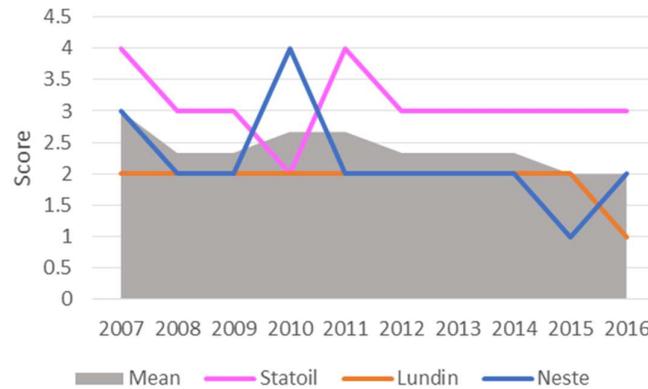
KPI 11 measures the amount of short-term strategies disclosed in the annual report within a 12-month horizon. The scores are distributed on a scale from 0-4. Typical examples of short-term strategies are disclosed in **Appendix C**.

Graph 13 reveals highly volatile score developments among all three companies. Statoil started in 2007 by receiving score 3, which represents five short-term objectives in the annual report, to later merely disclosing zero to two strategies for the remaining years. Lundin's score developed randomly between score 1 and 3, indicating a mix between one to six short-term objectives per year for the entire period analysed. The same pattern is observed for Neste, whose development in scores appears to be follow a random walk.

A common observation for all three companies is that they end with a lower score in 2016 than they began with in 2007. As such, the mean decreased from 2.67 to 1.33 in the period suggesting a negative development in this KPI.

KPI 12: Long-term strategies

Graph 14: KPI 12: Long-term strategies scores, 2007-2016



Source: Own construction

KPI 12 measures the amount of long-term strategies disclosed by the company in the annual reports beyond a 12-months horizon. The scores are distributed on a scale from 0-4. Typical examples of long-term strategies are disclosed in **Appendix D**.

Statoil's scores lay in the range 2-4 during the first six years of the analysed period, fluctuating in a range between 15-40 disclosed long-term strategies. After 2012, Statoil continued stably until the end of the analysed period, when 21-30 long-term strategies in the annual reports were disclosed. Lundin maintained score 2 for the first nine years and dropped to score 1 in 2016, indicating a decrease from disclosing 11-20 objectives to merely 1-10 in the annual reports. Again, Neste appears to follow a random walk in its score development and varies between score 1 to 4 throughout the period, representing disclosure between 5-36 strategies.

Similar to KPI 11, a pattern in the development of this KPI is unclear and difficult to grasp for each individual company. However, a collective observation shows that all companies attained a lower score in 2016 than in 2007. Thus, the mean has decreased from 3 to 2, suggesting the development under this KPI as negative.

7.1.1.1 Descriptive statistics

After a thorough examination of the 12 KPIs, a fundamental understanding of the companies' developments in the respective KPIs ought to be obtained. To attain an overview of this section, descriptive statistics of the 12 KPIs are calculated and displayed in **Table 3**.

Table 3: Descriptive statistics of the 12 KPIs

KPI	N	Min	Max	Mean			Standard deviation		
				2007	2016	Δ mean	2007	2016	Δ Std. Dev.
1	3	1.00	3.00	1.67	1.67	0.00	0.58	0.58	0.00
2	3	0.00	3.00	1.67	1.67	0.00	1.53	0.58	-0.95
3	3	1.00	3.00	1.67	2.67	1.00	0.58	0.58	0.00
4	3	0.85	1.98	1.49	1.45	0.00	0.44	0.20	-0.24
5	3	0.00	2.00	1.67	2.00	0.33	0.58	0.00	-0.58
6	3	1.00	2.00	1.33	1.67	0.33	0.58	0.58	0.00
7	3	1.00	3.00	2.33	1.67	-0.67	1.15	1.15	0.00
8	3	7.00	16.00	9.00	15.33	6.33	2.00	1.15	-0.85
9	3	1.00	4.00	2.00	2.67	0.67	1.73	1.53	-0.20
10	3	0.00	1.00	0.40	0.62	0.21	0.53	0.33	-0.19
11	3	0.00	4.00	2.67	1.33	-1.33	0.58	0.58	0.00
12	3	1.00	4.00	3.00	2.00	-1.00	1.00	1.00	0.00

Source: Own construction

Minimum and maximum values are disclosed to demonstrate the spread in each KPI. Mean scores in 2007 and 2016 are calculated to demonstrate the development in the examined period, while standard deviations in 2007 and 2016 are calculated to indicate how much the variation deviates from the mean⁶.

The figures under Δ mean in **Table 4** reveals that the development in the mean scores has been positive for six KPIs, constant for three, and negative for the remaining three. Thus, indicates that most of the KPIs have developed positively. The figures under Δ standard deviation reveals that six KPIs have decreased in its standard deviation between 2007 and 2016, indicating that companies are scoring closer to each other. This suggest that companies disclose their risk management more

⁶ Red=decrease between 2007-2016, yellow=constant between 2007-2016, green=positive between 2007-2016

similarly in these KPIs. The remaining six KPI figures under Δ standard deviation remained constant throughout the analysed period.

Table 4: Summary of development in mean and standard deviation of the 12 KPIs

	Δ Mean	Δ Standard deviation
Positively	6	0
Constantly	3	6
Negatively	3	6

Source: Own construction

Overall, the analysis has shown a positive development in KPIs when observing the means. Also, companies seem to score closer to each other over time when examining the standard deviations. It is clear that certain KPIs have fluctuated more than others, and that companies score significantly closer to each other in some KPIs throughout the period. The possible explanations will be further discussed on in chapter 8.

7.1.2 Aspect level

In the following section, the development of RMD on aspect level is analysed. As mentioned in section 5.3.1, the 12 KPIs in the RMDI are divided into the following four aspects of RMD: RKGN, PIRM, ERMD and STRG. As previously stated, the accumulated scores are not significant per se, as the growth is of importance. As such, the four aspects sum up the growth in the individual scores from the associated KPIs, as seen in **Figure 9**. The analysis on aspect level is based on scores from the RMDI at index 100. Thus, index in aspect A in time t is obtained through the following equation:

$$INDX_{i_t}^A = \frac{1}{3} \sum_{a=1}^3 \frac{KPI_{i_t}^a}{KPI_{i_t=2007}^a} * INDX_{i_t=2007}, \text{ where } INDX_{i_t=2007} = 100 \quad (11)$$

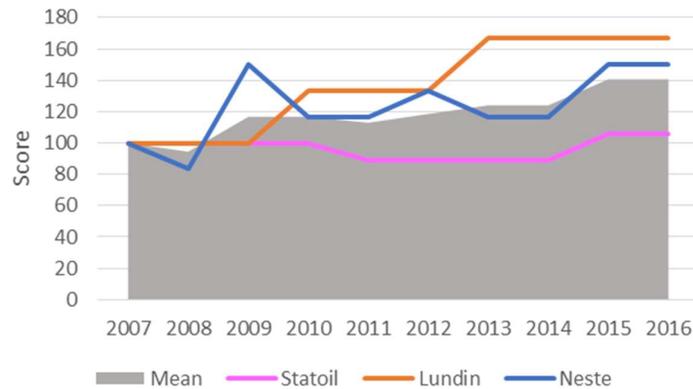
where,

- $INDX_{it}^A$ = indexed score growth for company i in aspect A in year t
- KP_{it}^a = absolute score for KPI a for company i in year t

This sub-section will analyse the development in RMD on the respective aspect level to examine whether patterns can be detected to a greater extent by grouping the KPIs into specific aspects.

Risk governance (RKN)

Graph 15: Development in RMD for RKN aspect, 2007-2016 (index = 100)

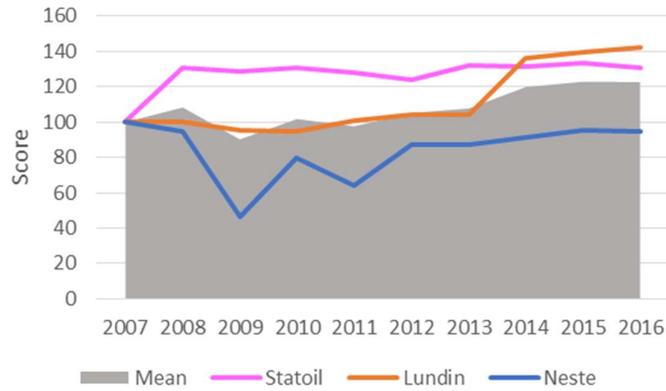


Source: Own construction

In the RKN aspect, it can be observed that Statoil maintains a stable level over the years, while Lundin increases gradually over the period and Neste moves relatively inconsistent. The mean growth illustrated by the grey area in **Graph 15** illustrates that the level of RKN has increased steadily until 2016. Overall, a positive mean growth can be identified in the aspect of RKN during 2007-2016.

Proxy for the importance of risk management (PIRM)

Graph 16: Development in RMD for PIRM aspect, 2007-2016 (index = 100)

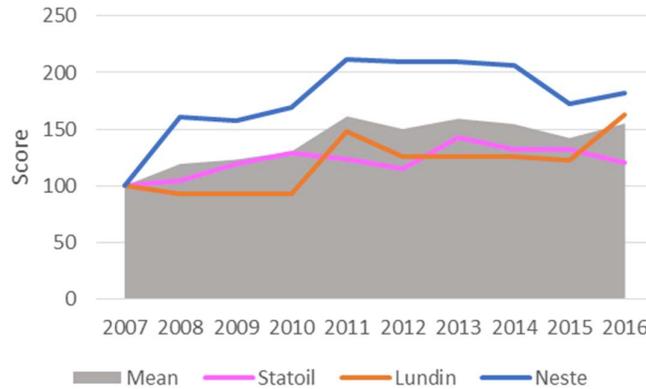


Source: Own construction

In the aspect of PIRM, both Statoil and Lundin developed stably throughout the period. Statoil took a sudden increase in 2008 driven by KPI 6, where risk management was assigned its own sub-section in the annual report. After 2008, Statoil maintained stable in this aspect. Lundin kept a steady development until 2013, when the company altered its outline of risks from in a sub-section to a separate section under KPI 5. Additionally, the overall increase was also driven by a higher 'risk'-to report length ratio under KPI 4. Overall, both Statoil and Lundin have developed steadily in PIRM from year to year, with a positive development. On the contrary, Neste started with a 50% drop in score during 2007-2009 before moving inconsistently until returning to the 2007 level in 2016. Overall, the mean for the three companies shows an average growth of 23% from 2007-2016, indicating a positive development in this aspect.

Extent of risk management disclosure (ERMD)

Graph 17: Development in RMD for ERMD aspect, 2007-2016 (index = 100)



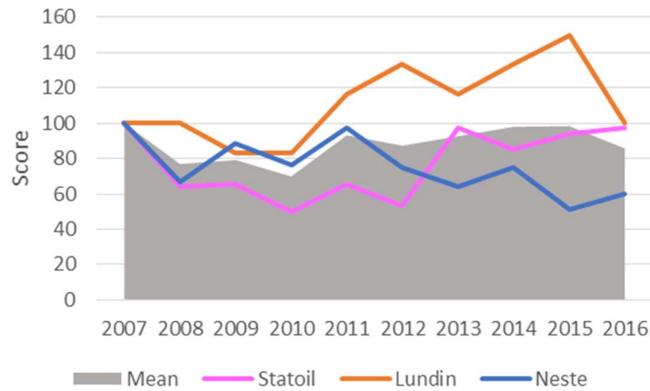
Source: Own construction

In the aspect of ERMD, all companies increased their scores over the analysed period with Neste showing the most significant growth with a development of 82% from 2007-2016. Lundin experienced a similar growth as Neste, although on a slightly lower level, whereas Statoil remained on a constant level over the years. Over the decade, Statoil experienced a significant increase in KPI 8. However, this effect was offset by the decrease in KPI 7, thus resulting in a constant pattern overall with no substantial improvement in score. Lundin experienced a clear growth in ERMD due to increases in KPI 8 and KPI 9. Although, this effect was slightly counterbalanced by the decrease in KPI 7 in the same period. Neste achieved the most significant growth in this aspect by a sharp increase in both KPI 7 and KPI 8 over the years, as well as a slight growth in KPI 9.

This aspect has developed more than 50% in average growth between 2007-2016, illustrated by the grey area in **Graph 17**. This increase was mainly driven by the increase in types of risks disclosed under KPI 8, which increased for all companies throughout the period.

Strategy (STRG)

Graph 18: Development in RMD for STRG aspect, 2007-2016 (index = 100)



Source: Own construction

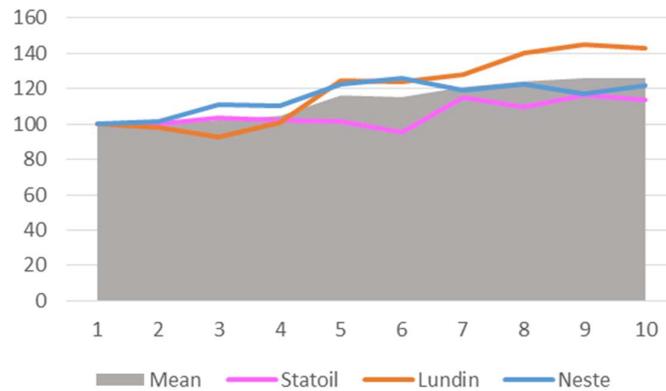
Graph 18 provides an immediate image that the companies have developed in different directions in the aspect of STRG. Lundin showed an overall positive growth from 2010-2015, whereas Statoil and Neste did not achieve a higher score at any point over the analysed period. The positive development for Lundin was due to the company disclosing mitigation strategies to 100% of its risk impacts under KPI 10. Further, the growth pattern for Lundin was driven by KPI 11, which was the underlying reason for the upsurges in 2012 and 2015.

In general, the development in the mean among the three companies shows a decline of 14% between 2007-2016, indicating a negative pattern in this aspect.

7.1.3 Total RMDI level

To compare the development in the three companies' total scores, **Equation 7** is adapted to recognise the degree of development at index 100 omitted from biases from the differences in score ranges.

Graph 19: Development in total RMDI level, 2007-2016 (index = 100)



Source: Own construction

Graph 19 provides a clear illustration of the development in companies' total RMDI scores. Throughout the examined period, all companies experienced growth on the RMDI level. Statoil presented the lowest index of 114 in 2016 corresponding to a 14% average growth in its KPI scores. Neste resulted in an index of 122 in 2016 corresponding to a 22% average growth over the analysed period. Lundin developed most significantly with an index of 143 in 2016 indicating an mean increase of 43% in its KPIs. The mean in 2016 is 126, suggesting an average growth of 26% across companies. The overall positive development is a result of growth in RSGN, PIRM and ERMD, which were partially offset by a negative growth in STRG.

7.1.4 Interim conclusion

This analysis studied the development of RMD scores in the RMDI on three levels, including single KPI, aspect and the total RMDI level. **Table 5** sums up the findings in the development of the three levels, based on the difference in the means between 2007-2016.

Table 5: Overview of development of KPIs, aspects and RMDI levels during 2007-2016

	KPIs (12)	Aspects (4)	RMDI (1)	Total
Positively	6	3	1	10
Constantly	3	0	0	3
Negatively	3	1	0	4

Source: Own construction

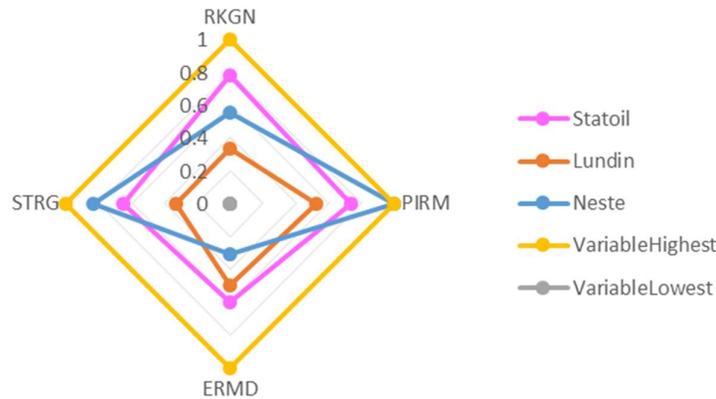
Half of the KPIs have developed positively, while the remaining have developed either constantly or negatively. When studying the aspect levels, RSGN, PIRM and ERMD developed positively, while STRG has developed negatively. This indicates that the different trends in the single KPI's are somewhat harmonised once observed on a considerable higher level. Finally, the development on the total RMDI level was found to be positive. In total, 10 elements showed to have increased in scores, three maintained constant and four obtained negative developments. Based on the summary of developments on the three respective levels, the analysis is in favour of supporting hypothesis one.

7.2 H2: Companies develop their RMD in similar patterns

The following section is set out to determine the veracity in the second hypothesis; *Companies develop their RMD in similar patterns throughout the analysed period.*

The study was performed through a descriptive analysis of the Disclosure Profile Index, as described under section 5.6. To revisit the methodology of the Disclosure Profile Index, a RMD profile is obtained by connecting the scores of each company in the four aspects. By examining the RMD profiles for the three companies throughout 2007-2016, patterns in companies' RMD developments are expected to be revealed.

Graph 20: Sample companies' RMD profiles, 2007



Source: Own construction

In 2007, the three companies presented considerably different RMD profiles, indicating different focuses in RMD represented by the four aspects. Statoil scored almost equally high in all four aspects forming a somewhat squared-shaped RMD profile. This indicates that Statoil focuses fairly equally on the four aspects at a considerably high level of RMD. Similarly, Lundin appeared to possess an almost equal balanced RMD profile as Statoil, although at approximately half the level in almost all aspect except for ERMD. Neste showed a relatively skewed RMD profile in 2007 with a 'leading practice' score in PIRM and close-to 'leading practice' score STRG, while the other two aspects are scored fairly weak.

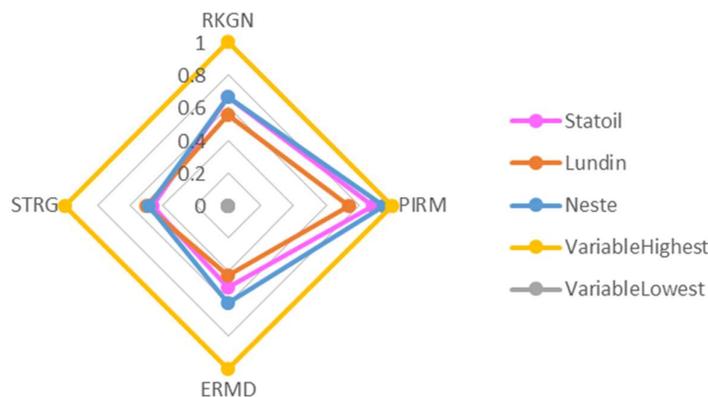
During 2008-2015, the companies developed their RMD profiles in rather different patterns. The illustrations of companies' RMD profiles in this period can be found in **Appendix G**. Statoil developed its RMD profile with minimum alterations in RKG, PIRM and ERMD, while STRG fluctuated comparatively to the other aspects. Lundin developed positively in three out of four aspects between 2008-2015, whereas ERMD was the only aspect without development throughout this period. Lundin kept its RMD profile somewhat balanced until 2014, when the company disclosed significantly more in STRG and PIRM compared to the other two aspects, which continued in 2015. In summary, a clear increase in the level of RMD is observed for Lundin in the RMD profile throughout the first nine years of the analysed period. Neste appears to fluctuate the

most in its RMD profile as the company seems to frequently switch focus among the different aspects up until 2012, before reaching a relatively balanced risk profile in the remaining years.

Throughout the first nine years of the observation period, the companies obtained significantly different patterns in development of RMD profiles. Statoil achieved the most stable RMD profile with only variation in STRG. Lundin developed most in the RMD profile across all four aspects, from obtaining the lowest RMD profile in 2007 to gradually increasing its RMD profile in a balanced manner up until 2014. In 2014-2015, Lundin began disclosing significantly more in STRG and PIRM, resulting in a more tilted profile. Neste's risk profile developed most randomly without any clear pattern in its RMD profiles throughout the period. The company maintained a relatively skewed RMD profile until 2012, after which it reached a more balanced RMD profile.

Despite the significant differences in historical RMD profiles, an interesting observation occurred in 2016 when all three companies obtained almost identical RMD profiles in the given year, as seen in **Graph 21**. The RMD profiles appearing in 2016 were characterised by close to 'leading practice' scores in PIRM, while the other aspects balanced around 0.5 on the index.

Graph 21: Sample companies' RMD profiles, 2016



Source: Own construction

7.2.1 Interim conclusion

By observing the RMD profiles throughout the analysed period, a clear distinction between the companies' development in RMD profiles can be acknowledged. Statoil represents the most steady and well-balanced RMD profile among the three companies with the only noticeable alteration in the STRG aspect. Lundin represents the most developed company, showing a gradual increase in all aspects except for ERMD throughout the analysed period. Neste represents the company with the most volatile RMD profile, suggesting different focus in the four aspects from year to year. Although the companies have developed their RMD profiles in significantly different patterns since 2007, all companies managed to reach a similar RMD profile in 2016. This may suggest that this particular RMD profile is common for the industry, which will be further discussed in chapter 8. In the light of the hypothesis, the analysis did not show similar patterns in RMD profile development throughout the analysed period. Thus, the hypothesis is not supported by the analysis.

7.3 H3: High level of RMD causes less negative impact on EBIT during downturns

The following analysis aims to validate the third hypothesis: *A company with high level of RMD experiences less negative impact on EBIT during downturns.*

As argued in section 4.1.3, the true value of risk management is evident in periods of downturn. Two analyses are conducted for the downturns in 2008 and 2014, as presented in section 3.2, where RMD scores are observed against indexed EBIT in the respective periods. Recall from section 6.1.4.1, due to companies are affected by the oil prices to different degrees, EBIT⁷ is normalised from oil effects to further isolate the effect from RMD. Additionally, as the score ranges among the 12 KPIs differ significantly, applying the sum of the 12 absolute scores will create bias in the regression, as KPIs with larger score ranges impacts the total scores more. Therefore, **Equation 6** is applied to adjust the total RMD scores.

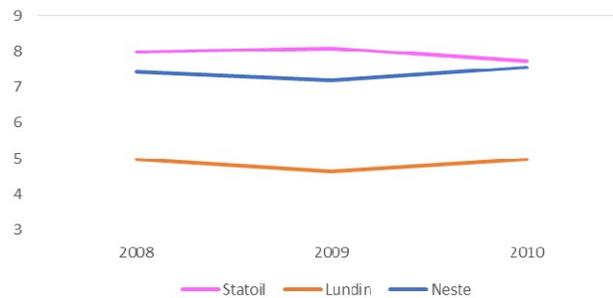
⁷ Lundin has disclosed the expected oil price effect on their net income rather on EBIT. Although difference in the effect on EBIT and net profit is acknowledged, due to data restriction, the same effect is applied for the purpose of the analysis.

To verify this hypothesis, the rank of the company's RMD score should correspond with its rank in the indexed EBIT, in order to prove that high RMD score prevents company from substantial loss in EBIT compared to peers during downturns.

7.3.1 RMD effect on EBIT during the oil price collapse in 2008

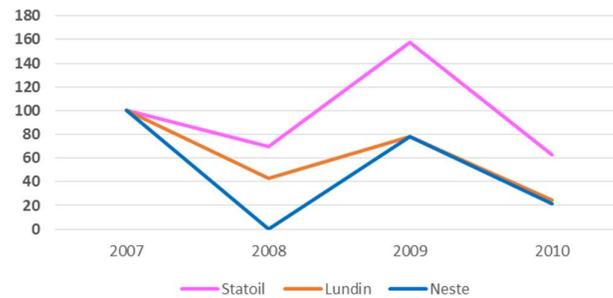
For the analysis of the oil price collapse in 2008, EBIT is indexed against the year prior to the collapse, i.e. 2007 at index 100. This is done in order to compare fluctuations in EBIT across companies during the downturn period after the oil price collapse occurred in 2008. The RMD score is observed against indexed EBIT to evaluate whether absolute RMD score corresponds with development in EBIT during the downturn.

Graph 22: Absolute RMD scores, 2008-2010



Source: Own construction

Graph 23: Normalised EBIT, 2007-2010 (index = 100 at 2007)



Source: Own construction

As seen in **Graph 22**, the absolute RMD scores for the companies follow a clear rank, where Statoil has the highest RMD score throughout the period and Lundin the lowest. For the hypothesis to be valid, Statoil should receive less negative impact on EBIT in the downturn period, whereas Lundin is expected to receive the most undesirable effect on EBIT. However, as observed in **Graph 23**, this expectation is only partially met. **Table 6** shows an overview of whether each company's rank in RMD corresponds to its rank in EBIT, where "YES" supports the hypothesis and "NO" does not.

Table 6: Test of correlation between RMD and EBIT in the downturn period from oil collapse in 2008

	2008	2009	2010
Statoil	YES	YES	YES
Neste	NO	NO	NO
Lundin	NO	NO	NO

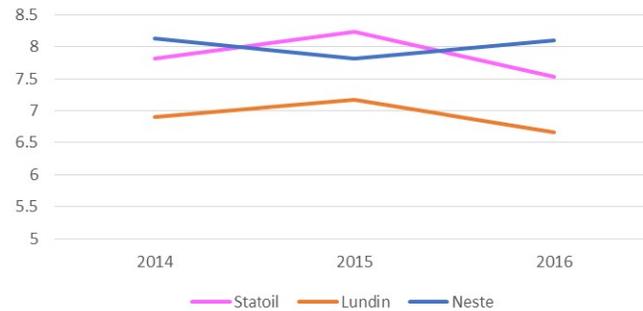
Source: Own construction

As seen in **Table 6**, the hypothesis is true for Statoil indicating the company's operating profit is less affected by the downturn compared to Lundin and Neste. However, the remaining two companies showed different patterns. Lundin clearly showed the lowest level of RMD throughout the period, but managed to maintain its EBIT on a rather stable level compared to Neste, who otherwise had a higher RMD score in all years.

7.3.2 RMD effect on EBIT during the oil price collapse in 2014

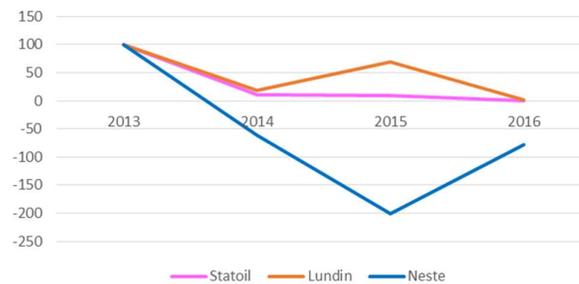
The same reasoning as for 7.3.1 will be used for the oil price collapse in 2014, as the analysis will look at the period 2014-2016 to get the full effect of the downturn. Again, EBIT was indexed against the year prior to the collapse, i.e. 2013.

Graph 24: Absolute RMD scores, 2014-2016



Source: Own construction

Graph 25: Normalised EBIT, 2014-2016 (indexed = 100 at 2013)



Source: Own construction

The same observation was made for 2014-2016 as for 2008-2010. Statoil and Neste took turns on having the highest RMD score throughout the period, whereas Lundin demonstrated the lowest level. As seen in **Graph 25**, Lundin's EBIT was least impacted in the downturn period, even though the company had the lowest RMD score throughout all years. Statoil underperformed Lundin in the period by failing to withhold the EBIT during the downturn, despite a higher RMD score. Neste's EBIT experienced the most negative impacts with a significant hit in 2015. The test of the hypothesis is presented in **Table 7**.

Table 7: Test of correlation between RMD and EBIT in the downturn period from oil collapse in 2014

	2014	2015	2016
Statoil	YES	NO	YES
Neste	NO	NO	NO
Lundin	NO	NO	NO

Source: Own construction

As seen in **Table 7**, the companies' RMD scores and development in EBITs in the subsequent years of the oil crisis do not support that a high level of RMD prevents companies from substantial impacts on operating profits during downturns.

7.3.3 Interim conclusion

During the downturn period after the oil crisis in 2008, Statoil was the only company whose rank in RMD score corresponded with the rank in development in EBIT. However, Statoil did not present similar findings in the following oil collapse in 2014, as the high RMD level did not impact EBIT to a lesser extent for all years analysed. Lundin and Neste presented no findings where RMD rank and EBIT development corresponded according to the hypothesis. Based on the analyses, there is no support for validating the third hypothesis, suggesting that a high RMD level does not cause a less negative impact on EBIT during downturns.

7.4 H4: Positive correlation between RMD and EBIT

The following analysis intends to examine the fourth hypothesis: *There is a positive correlation between a company's RMD and EBIT.*

The analysis is performed through a linear regression to examine whether a relationship between indexed annual EBIT and indexed annual RMD, exists. The regression analyses are conducted separately for the three companies.

Same argument as under H3, RMD scores are obtained from **Equation 6**, and EBIT is normalised for this analysis. The regressions are obtained from the following equation:

$$EBIT_i = \alpha_i + \beta_{RMD_i} * RMD_i \quad (12)$$

where,

- $EBIT_i$ = EBIT for company i
- RMD_i = RMD score for company i

7.4.1 Regression analysis

Three regression analysis are conducted on the three companies individually to investigate whether a correlation between RMD and EBIT is present. A significance level of 0.10 is applied for the analysis.

Table 8: Regression analysis output for Equation 12

Company	α_i	β_{RMD_i}	R^2	$p - value$
Statoil	453.72	-3.42	0.18	0.219
Lundin	424.67	-3.77	0.61	0.008
Neste	-263.75	3.07	0.26	0.131

Source: Own construction

The most significant result in **Table 8** is the observation of Lundin with a p-value of 0.008, far less than the significance level of 0.10, which indicates a significant result. Additionally, the regression also displays the highest R^2 value of 0.61, which indicates that the model explains 61% of variability within the data. Furthermore, as Lundin's beta shows -3.77, the regression analysis suggests a negative correlation between RMD and EBIT. Both Statoil and Neste have shown insignificant results as they obtain p-values at 0.219 and 0.131 respectively, which are beyond the significance level.

7.4.2 Interim Conclusion

By analysing the three companies separately, the study found a linear regression model for Lundin with a R^2 value of 0.61. As EBIT is driven by many other factors than risk management, a model that predicts 61% of variability in the data is considered a well-fitted model. Lundin's beta is found to be -3.77, indicating the correlation between RMD and EBIT is negative. Meanwhile, since both Neste

and Statoil attained a p-value above the significance level, the results are not significant enough for any interpretation.

As Statoil and Neste have presented insignificant results and Lundin identified a negative correlation between its RMD and EBIT, the analysis suggests H4 to be rejected.

7.5 H5: Positive correlation between RMD and share price

The following analysis intends to examine the fifth hypothesis: *There is a positive correlation between a company's RMD and share price.*

For the period analysed, the sample companies published their annual reports between March and April. Thus, the subsequent financial quarter, i.e. the *second quarter* (hereafter Q2), was assumed appropriate for data extraction (Lundin Petroleum, 2018a; Neste Oil, 2018a; Statoil ASA, 2018b). According to Lars Topholm, Carnegie Investment Bank, the stock market often reacts to a publication of an annual report based on the disclosed financials (L. Topholm, personal interview, March 16, 2018). To eliminate such noise, the median of Q2 share prices is used for this analysis in order to eliminate extreme reactions in the stock market in terms of outliers.

The same argument as in the previous two hypotheses, RMD scores in the RMDI are recalculated to avoid bias. Similar as for H4, three regression analyses are conducted on each respective company to investigate whether a correlation between RMD and share price is present. The regressions were obtained from the following equation:

$$SP_i = \alpha_i + \beta_{RMD_i} * RMD_i \quad (13)$$

Where,

- SP_i = share price for company i
- RMD_i = RMD score for company i

7.5.1 Regression analysis

Three regression analysis were performed to investigate whether a correlation between RMD and share price is present among the sample companies. A significance level of 0.10 is applied for the analysis.

Table 9: Regression analysis output for Equation 13

Company	α_i	β_{RMD_i}	R^2	$p - value$
Statoil	64.01	0.39	0.31	0.098
Lundin	-477.191	6.05	0.75	0.001
Neste	-32.87	1.07	0.05	0.551

Source: Own construction

The most significant result from the regression analysis is presented by Lundin. Lundin obtained a p-value of 0.001, far below the significance level. Furthermore, a R^2 value of 0.751 indicates that the model explains 75% of the variation within the data suggesting a substantially well-fitted model. Lundin's beta is equal to 6.05 suggesting a positive relationship between the company's RMD and its share price.

Statoil obtains the second most significant result with a p-value of 0.098. The regression attains a R^2 value of 0.305 suggesting that the model explains 31% of the total variation. Although the goodness-of-fit is not particularly high, it is considered that the model suggests a correlation. However, Lundin's beta is only 0.39 indicating that only a slightly positive relationship is present between the company's RMD and its share price.

Neste obtained a p-value of 0.551 suggesting insignificant data. As such, no meaningful interpretation can be drawn from the outputs.

7.5.2 Interim Conclusion

By analysing the companies individually through linear regressions, different degrees of correlations were found. Based on the p-values, the most significant result is identified for Lundin, where beta is equal to 6.05 and the model suggested that Lundin's RMD explains 75% of the share price. Lundin

also obtained a well-fitted model under H4, which may suggest that a strong correlation exists between the company's RMD, EBIT and share price. This will be further discuss this in chapter 8. The second most significant result was for Statoil, where the correlation was slightly positive at 0.39, but the model merely explains 31% of the variation in the data, indicating a weaker correlation between RMD and share price for Statoil than Lundin. Neste is the only observation that was not significant, as the p-value is above the significance level. In summary, the analysis is in favour of verifying H5, as a positive correlation is found between RMD and share price for Lundin and Statoil.

8 Discussion

The first part of this chapter discusses the most significant methodological choices and assumptions employed throughout this study and how they affect the results. Furthermore, in the context of the research question and the oil industry, the results obtained in chapter 7 are discussed in the last part of this chapter.

8.1 Discussion of research approach

Certain aspects of the research approach applied in this study may challenge the applicability of the results to some extent. The first part of the discussion will thus focus on the impacts from the methodological choice and the underlying assumptions.

8.1.1 Sample size

As the population chosen for this study is relatively small, the sample size comprises of merely three companies in the empirical analysis. However, it is believed that the sample companies are representative for the population as they cover 88%⁸ of the total market share. The difference in the sample companies' characteristics may potentially lead to some impacts on the findings and results.

⁸ As per 31 December 2016

Firstly, the limited number of samples may lead to statistically insignificant results. Findings and results from chapter 7 may therefore merely indicate support or contradiction of the hypotheses, as the limited data points challenge the significance of the results.

Secondly, Statoil holds a market share of 76%, which is significantly larger than Neste and Lundin, holding 13% and 9% respectively. Thus, Statoil's size may influence the level of RMD in some manner as the company may have more shareholder demands to live up to and operate with a larger portfolio. However, as the Norwegian government owns 67% of Statoil, the remaining outstanding shares may be comparable with the other two companies and therefore counteract the influences from the larger market share. Therefore, the study suggests that the level of RMD is not considerably influenced by Statoil's dominance in size.

Thirdly, the population includes companies that operate in different sectors within the energy industry. Lundin operates solely with oil, whereas Neste with oil and renewable energy, and Statoil with oil, gas and renewable energy. Nevertheless, oil comprise the largest share of revenue for all companies (Neste Oil, 2016; Statoil ASA, 2016). The sample companies operate within different streams of oil production including integrated, downstream, and upstream sectors. Hence, although the risks are assumed similar for all companies, the extent of each risk may differ. Consequently, the difference in characteristics reduces homogeneity among the sample companies, which mainly affects the results regarding value creation rather than development in RMD. Despite being dependent on different commodity prices to different degrees, the companies still operate in the same industry and are thus exposed to similar risk environments. This indicates comparable risk management, suggesting comparable RMD, which suggests that differences in operations should not substantially differentiate the level of RMD. However, companies' earnings and stock prices depend directly on the different commodity prices. As mentioned in section 6.1.4.1, this study has only adjusted EBIT from oil price effects for the analysis, whereas price effects from other commodities are disregarded. Thus, effects from other commodity prices, namely gas and renewable energy, may create noise when comparing EBIT and stock prices across companies. This is acknowledged as a weakness in the analysis due to the restricted size of population.

The discussed issues in this section are assumed less important when observing the trends and developments in RMD in the industry, whereas they may create bias when comparing value creation

across companies under H3-H5. As mentioned in section 1.4.2, the population of this study has been recognised as limited in size. Consequently, the authors acknowledge that an optimal population would be larger and characterised by one specific stream in the oil industry in order to increase the validity of the results. Nevertheless, the sample size of this study was based on the criteria established in section 6.2 and is considered sufficient as empirical data.

8.1.2 Designing of the RMDI

As mentioned in section 5.3.1, the RMDI consists of 12 KPIs derived from 'leading practice' identified from the literature review. However, it needs to be acknowledged that there were certain assumptions made during the design of the RMDI that may impact the results of this study, as outlined below.

Firstly, the 12 KPIs were chosen in a subjective matter based on what the authors identified as the most important measures of RMD from the literature review. One could argue whether alternative KPIs would have been more appropriate as indication of 'leading practice'. However, as the selection was based on an assessment of existing findings from literature, the 12 identified KPIs are reasoned to be sufficient. Previous researches have constructed indices that contained items varying from 17 to 224 KPIs (Barrett, 1976; Cooke, 1989). Therefore, it could be suggested that the index may not be extensive enough to reflect the full picture of companies' RMD. Nevertheless, although only 12 KPIs were used, it is argued that the authors of this study have to their best effort developed an index believed to cover RMD on a holistic level based on existing literature within the limited time and resources of this study.

Secondly, the RMDI defines RMD in terms of quantity rather than evaluating the quality. Thus, although the KPI scores reveals certain features of a company's RMD, it does not examine the contents. For instance, KPI 11 quantifies the number of short-term strategies disclosed in the annual report. However, it does not express e.g. to what extent these strategies are set, the way the strategies are presented, or whether they are quantified etc. This characteristic of the RMDI is noteworthy to highlight, as it may generate limitations when analysing a company's RMD based on its RMDI scores.

Thirdly, the total score across the entire RMDI is an imprecise and skewed measure as the KPIs do not have the same score ranges. Nevertheless, this issue is resolved by using intermediate calculations, such as **Equation 6** and **Equation 7**. **Equation 6** indexes the absolute scores by calculating them in relation to the maximum score and minimum score within each KPI. **Equation 7** determines the average growth across all KPIs at index 100. These calculations eliminate the issue of different score ranges and result in an ability to compare the companies' scores across the entire RMDI, both on growth and absolute level. Alternatively, an index with perfectly comparable scores across the entire RMDI could have been obtained through **Equation 6** from the beginning as this method enables immediate benchmarking between companies. However, such method will conceal the characteristics of the RMD underlying the absolute scores. Therefore, this study has chosen to design the RMDI based on absolute scores and utilise intermediate calculations to eliminate the biases caused by the difference in score ranges.

8.2 Discussion of analysis and results

The overall objective of this section is to discuss the intuitions behind the results obtained in chapter 7 in contrast to literature and the degree to which they are relevant in the context of the oil industry. The discussion will focus on the findings and underlying drivers of the results in the analysis for the five hypotheses.

8.2.1 H1: Positive development in RMD

The findings presented a positive development in the overall RMD between 2007-2016. This is consistent with the underlying expectation that companies increase focus on risk management as a consequence of several macroeconomic events, and thereby foster the level of RMD. The majority of elements in the RMDI developed positively over the years, with certain KPIs driving the overall development by presenting more evident growth than others. More specifically, three KPIs including *types of risk disclosed*, *potential risk impacts*, and *risk mitigation* showed particular advances by growing between 35-70%, respectively over the years. Additionally, the finding from KPI 10a indicates that a higher proportion of financial than non-financial risks have mitigation strategies in the annual reports. This may suggest that financial risks signal more evident monetary

consequences and are thus given more attention. Furthermore, all three KPIs associated with the PIRM aspect showed positive developments, meaning that any outline of risk, such as risk sections and mentioning of risks, have improved in the annual reports. Following the outlined findings, the significance of risk management has increased throughout the analysed period, indicating a general increase in risk awareness in the Nordic oil industry. This may be a result of the financial crisis and the oil collapse in 2008 and the subsequent oil collapse in 2014, as such events potentially motivated companies to increase focus on RMD in order to retain confidence from investors. Evidently, Nordic oil companies have demonstrated increasing transparency by disclosing greater amounts of risk, potentially motivated by the intension to increase market confidence, especially during turbulent periods. By increasing RMD to improve transparency towards shareholders, companies follow the finding of Emm et al. (2007), who argue that improved transparency increase shareholder confidence. This is consistent with the general tendency reported by ACCA (2014) that companies increased voluntary disclosure of risk management to increase transparency towards stakeholders, in the effort to restore investor confidence after the crisis.

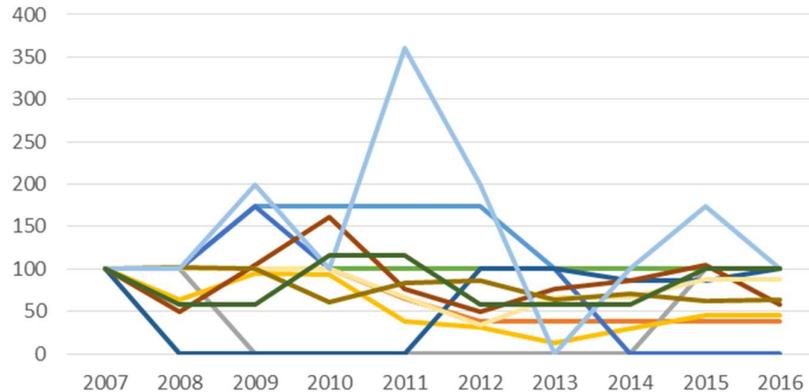
The most evident decreases over the period were experienced by KPI 11 and KPI 12, suggesting that companies are less willing to disclose future strategies. Linsley & Shrides (2000) claim that providing forward-looking information can be value creating for stakeholders, as they can better manage their own risks and make portfolio management decisions. Following this argument, the findings of this study do not comply with the initial expectations. However, this can be explained by Acher (1998), who argues that disclosed risk information should not include too commercially sensitive information that can be utilised by competitors or potential entrants. This could lead to a proprietary cost, hence putting a company at a competitive disadvantage. In this study, both KPI 11 and KPI 12 are areas of RMD with high tendency to disclose commercially sensitive information that might put a company in disadvantage. This may indicate a general cautiousness for companies when disclosing future strategies in annual reports. Alternatively, the negative development could also suggest that Nordic oil companies are less competent at identifying opportunities in times of turbulence due to uncertainties in the risk environment, resulting in less confidence to set future strategies.

Findings presented in this study show that certain KPIs experienced highly fluctuating movements, while others developed in rather rigid patterns. *Frequency of internal risk assessment, types of risks*

disclosed, and *future strategies* are among the KPIs that have varied most significantly throughout the analysed period. On the contrary, *risk ownership* and *standardised risk management frameworks* barely experienced any alterations throughout the period. Potential reasons for the differences in the KPI developments could be that the former three KPIs might be adjusted ad hoc depending on the company's risk environment, whereas the latter three are more cost intense and thus less flexible to alter as they affect the whole company structure. As such, it could be argued that the former mentioned KPIs are more short-term adjusted, whereas the latter are fixed for long-term periods. Furthermore, the findings suggest that the industry remains nearly unchanged in the risk governance structures, although presenting room for improvement. This may suggest that while companies adjust short-term KPIs frequently, they remain passive when executing rather cost intense and long-term plans within risk management.

In the light of the research question and the findings from the analysis, it is valuable to discuss the standard deviations of the KPIs throughout the analysed period. This statistical measure indicates the similarity in companies' KPI scores. **Graph 26** is developed by indexing the standard deviations for the 12 KPIs at index 100. When a KPI appear below index 100, the companies disclose risk management more similar to each other as compared to the starting point in 2007, i.e. the RMD in the given KPI has developed more homogeneous. DiMaggio & Powell (1983) argue that due to industry competitiveness to attract more investment through signalling their behaviour of best practice, no company is willing to be unevaluated by the market, leading to mimetic isomorphism behaviour. When observing the analysis of the KPI developments from the graph, they appear to follow this view. As seen in **Graph 26**, the KPIs seem to deviate further from each other during 2008-2013 as compared to the beginning of the period, whereas the majority of the KPIs decrease closer towards zero for the remaining period. The result suggests that the development of the KPIs in the industry lack homogeneity during the first half of the analysed period. Considering the financial crisis and oil collapse in 2008, the large deviations may suggest that companies apply different strategies of risk management in order to cope with the crisis. However, following the second oil crisis in 2014, companies appear to obtain more similar scores for the majority of the KPIs, indicating a more homogenous RMD among companies that ties to DiMaggio & Powell's (1983) theory of industry mimetic isomorphism.

Graph 26: Standard deviations in KPI developments, 2007-2016 (index = 100)



Source: Own construction

8.2.2 H2: Companies develop their RMD in similar patterns

The results from the analysis for H2 has suggested a rejection of the hypothesis. At the beginning of the period, all sample companies appeared to have highly different RMD profiles followed by several years of profile developments in vastly different directions. At first glance, the findings contradict Lars Ragnar Vigdel's statement that companies in the oil industry benchmark their disclosed information against one another and adjust according to their competitors (L.R. Vigdel, personal interview, March 08, 2018) as well as DiMaggio & Powell's (1983) theory on industry mimetic isomorphism. However, by closer observation, the analysis has shown indication to support these believes. By assessing companies' RMD profiles in the beginning of the analysed period, Statoil can be identified close to 'leading practice' characterised by a rather mature RMD profile, which the company somewhat maintained throughout the period. As mentioned in section 6.2.1, Statoil already achieved a readily standard of RMD in 2007 as the company reported according to US GAAP up until 2006, which may have contributed to the mature RMD profile in 2007. As observed over the period, Lundin initially presented a rather immature RMD profile and developed gradually and consistently towards a similar profile as Statoil. This development could either be motivated from an internal assessment or from external benchmarking against a competitor, such as Statoil. Thus, the development in Lundin's RMD profile supports Lars Ragnar Vigdel's statement. On the contrary, Neste's development in the RMD profile appears to either

follow a random walk or is based on trial and error approach, as the company seems to switch focus on different RMD aspects throughout the period.

Despite the vastly different development in patterns throughout the years, the sample companies seem to have attained almost identical RMD profiles in 2016. As Emm et al. (2007) argue, the board of directors should disclose risks to the point where the marginal cost equals the marginal benefit. Thus, disclosing further information than the similar RMD profile in 2016 may not give any company enough benefits to exceed the costs as all companies seem to disclose in a similar manner. Similar to the discussion in H1, the development towards similar RMD profiles by the end of the period supports DiMaggio & Powell's (1983) theory on industry mimetic isomorphism and Lars Ragnar Vigdel's statement on industry benchmarking. Thus, H2 suggests that RMD is not only developing towards homogeneity on single KPI level but also in terms of companies' RMD profiles, indicating that companies' focus their RMD in similar manners. Even though the RMD profiles in 2016 appeared fairly similar, it is difficult to make any definitive interpretation on such a profile due to that this was the only year companies showed a similar profile as well as the small sample size, as discussed in section 8.1.1. Further research is therefore suggested to investigate a larger population in order to examine whether the RMD profile in 2016 suggests to be a common practice in the Nordic oil industry.

Despite the companies obtained similar RMD profiles in 2016, the sample companies have developed in fairly different patterns throughout the majority of the analysed period. Since the aim of the analysis is to identify similar patterns throughout the period rather than in one given year, it may be suggested that the analysis does not support the hypothesis.

8.2.3 H3: High level of RMD causes less negative impact on EBIT during downturns

The results obtained in the analysis presented no support for validating H3, indicating that a high level of RMD does not cause a less negative impact on EBIT in downturns. The underlying motivation for the hypothesis was based on the argument that the true value of risk management is evident in turbulent periods, as the purpose of administrating risk is to protect the company against damage and loss. This is discussed by Deloitte (2013b) and Dionne (2013), who define risk management as the tool that prevents occurrence of any event that may affect the company's ability to reach its

goals. This translates to long-run competitive advantage, leading to value creation for the company. Therefore, the results contradict the initial expectation that a company with a higher level of RMD would experience less negative impact on its EBIT during the oil price collapses. The contradicting result to the hypothesis may be due to the potential bias in EBIT addressed in section 6.1.4.1. Merely normalising companies' EBIT from the oil price effect may not be sufficient to eliminate the bias caused by the difference in the companies' operations. An alternative explanation could be that companies' actual risk management differ from what is disclosed on risk management. Some companies disclose their actual risk management in detail, while others merely disclose minimum requirements. Such mixed motivations for disclosing different extents of information relate to signalling and political cost theories. The theories explain how company may selectively disclose information in their favour (Deegan & Gordon, 1996; Morris, 1987; Ross, 1977; Spence, 1973; Watts et al., 1986). Hence, unknown potential difference may exist between RMD and the actual risk management. Thus, one may argue that Nordic oil companies' RMD differ considerably from their actual risk management, as the results contradict the initial expectation derived from literature. Consequently, the result presented no support for the hypothesis.

8.2.4 H4: Positive correlation between RMD and EBIT

The results from the analysis for H4 provided no evidence to support a positive correlation between RMD and EBIT. The only significant result that presented a relatively strong correlation was Lundin, which was found to be negative and thereby reverses the hypothesis. Meanwhile, no correlation was found between RMD and EBIT for neither Statoil nor Neste. This may follow the same potential reason as for H3 that EBIT remains biased. As Lundin solely operates within the upstream oil sector, it is the only sample company whose EBIT is truly normalised of commodity effects, which may explain why Lundin was the only company with a significant result. One could further argue that a potential reason why no positive correlation was found, is that other factors than risk management influence EBIT. Hence, the correlation between RMD and EBIT may be challenging to detect due to noise from the other factors.

Despite no support was provided for the rationale underlying the hypothesis, the result observed for Lundin suggests an alternative setting. The negative correlation between RMD and EBIT may

indicate opposite causality implying that a decrease in EBIT motivates the company to disclose additional risk management information, rather than RMD having a positive impact on EBIT. According to Emm et al. (2007), additional disclosure of risk can be value adding by increasing market confidence from improved transparency. Lars Topholm, Carnegie Investment Bank, argues that a company's fundamental value lays within the ability to generate cash from operations. Thus EBIT reflects the fundamental value of a company (L. Topholm, personal interview, March 16, 2018). This suggests that investor confidence is highly driven by a company's financials, such as EBIT, as it indicates a measure of value of the company. Thus, it could be argued that companies are likely to increase RMD to retain investor confidence in times of undesirable financials. Lundin's results may therefore suggest that the company discloses risk management according to EBIT, which is vice versa of the hypothesis. Thus the alternative setting for the hypothesis may be that a less desirable EBIT will result in the company increasing RMD in order to restore investors' confidence. On the contrary, a company that achieves desirable results in EBIT may retain the RMD level to avoid additional costs, as the financial result alone is enough to gain the investors' confidence.

To sum up, the results indicated no positive correlation for RMD and EBIT. Companies' RMD may differ considerably from the actual risk management, as signalling and political cost theories suggest that companies might selectively disclose risk management in their own favour (Deegan & Gordon, 1996; Morris, 1987; Ross, 1977; Spence, 1973; Watts et al., 1986). This challenges the underlying assumption for this hypothesis. In addition, Lundin's results suggest that RMD could simply act as a device to retain shareholders' confidence in the company in times of undesirable financial results. Hence, both the causality and correlation between RMD and EBIT contradict to the underlying rationale behind the hypothesis, indicating that companies' financial results may impact the level of RMD, rather than vice versa. Following that result, the hypothesis is suggested to be rejected.

8.2.5 H5: Positive correlation between RMD and share price

In the analysis of H5, positive correlation between RMD and share price were found for Lundin and Statoil, although Lundin being the only significant correlation. As seen in the results from H1, Lundin presented the most significant development in RMD among the sample companies. Therefore, it may suggest that Lundin has established increased risk awareness and improved ability to grasp the

risk environment. Over the period analysed, Lundin's development in RMD indicates constant improvement in the area of risk identification and risk management, possibly leading to increased shareholder confidence in the company. Additionally, the result for Lundin in this hypothesis can be linked with the result from H4, where Lundin presented a negative correlation between RMD and EBIT. Together, the results suggest that a decrease in EBIT may encourage Lundin to disclose additional risk management information through its annual reports in order to retain shareholders' confidence in the company. This could explain Lundin's subsequent increase in share price despite the negative development in EBIT.

Statoil showed a slightly positive correlation between its RMD and share price. Linking the correlation to the findings from H1 and H2, Statoil showed the least development in RMD over the period, both in terms of KPIs and RMD profile. Hence, a significant correlation may be difficult to detect, as the company maintained a rigid RMD over the years. Meanwhile, Neste showed no correlation for the two variables, leaving no findings for interpretation.

It is acknowledged that a company's share price is dependent on various factors and that RMD is merely a fragment of these factors. However, Lam (2014) considers the annual report as the main vehicle to disclose key information to the company's stakeholders. Results from H1 and H2 support the increasing importance of RMD in the annual reports, given that the extent and degree of RMD have evidently improved over the analysed period. Furthermore, it is important to bear in mind that the RMDI is constructed to grasp RMD by quantity rather than quality, as discussed in section 8.1.2. Thus, shareholders could have obtained information on content from the annual report that persuades them in alternative directions than what the RMDI captured in this study.

In summary, both Lundin and Statoil have shown positive correlations between RMD and stock price. This is in line with Emm et al.'s (2007) argument that risk disclosure can create value by increasing transparency towards shareholders. Thus, the suggested correlation between RMD and share price may be explained by enhanced investor confidence.

9 Conclusion

This study examined the development of RMD in annual reports and the value creation for listed Nordic oil companies in the period 2007-2016. A summary of the outcomes from the hypotheses testing is presented in **Table 10**.

Table 10: Summary of outcomes of hypotheses testing

Hypotheses	Outcome
1. <i>There is a positive development in risk disclosure among the target companies throughout the analysed period.</i>	Supported
2. <i>Companies develop their RMD in similar patterns throughout the analysed period.</i>	Not supported
3. <i>A company with a high level of RMD experience less negative impact on its EBIT during the oil price collapses in 2008 and 2014.</i>	Not supported
4. <i>There is a positive correlation between a company's RMD and EBIT.</i>	Not supported
5. <i>There is a positive correlation between a company's RMD and share price.</i>	Supported

Source: Own construction

The findings presented that RMD among listed Nordic oil companies has developed positively throughout the analysed period. Results showed 10 out of 17 elements in the RMDI presented positive developments. Companies' disclosure of *types of risk disclosed*, *potential risk impacts*, and *risk mitigation* were the key drivers of the growth in RMD. Additionally, the study found that a slightly higher proportion of financial risks has mitigation strategies in the annual reports compared to non-financial risks. The increase in RMD for the population in the analysed period corresponds with ACCA's (2014) study, reporting that companies have increased their voluntarily disclosure after the global financial crisis in 2008 in an effort to restore investor confidence.

Companies presented vastly different development patterns in RMD throughout the analysed period. Though, half of the KPIs presented a lower standard deviation in 2016 than in 2007, while the other half remained constant. This suggests that companies disclosed risk management more homogeneous towards the end of the period. Thus, findings suggest support for DiMaggio & Powell's (1983) argument on industry mimetic isomorphism behaviour. This empirical confirmation of the literature is further indicated by the similar RMD profiles obtained by the companies at the final year of the analysed period. However, the significance of this finding requires further research.

The results of this study found no evidence to support a positive relationship between RMD and EBIT. Given that EBIT represents the fundamental value of a company and previous research suggests that potential value can be created from risk management (COSO, 2004; Deloitte, 2015a; L. Topholm, personal communication, March 16, 2018; Nocco et al., 2006), the results failed to provide support thereto. However, findings support a negative correlation between RMD and EBIT, which contradicts the expectation based on the literature.

Previous literature suggests that increase in disclosure of risk management enhances share price (Clarke & Varma, 1999; Emm et al., 2007; Linsley & Shrives, 2000). The outcomes of this study seem to support previous findings from literature by providing a statistically significant correlation between RMD and share price.

To answer the research question, this study has found evidence to support that RMD has developed positively among listed Nordic oil companies over the period 2007-2016. In addition, companies appear to disclose risk management more homogeneous in 2016 compared to 2007, although development patterns varied vastly. Regarding value creation, results showed no support of RMD adding value in terms of operational earnings. However, a positive correlation between RMD and share price is presented by the results. Thus, the value creation of RMD remains ambiguous in this study.

The aim of this study has been to contribute to existing literature in the topic of RMD. This was performed by employing general concepts of risk management and the incentives of RMD to the empirical analysis of the listed Nordic oil industry in the period 2007-2016. The significance of the results in this study may be challenged due the limited sample size. Furthermore, subjectivity could not be fully eliminated from the analysis of content in the annual reports. The method and results were, however, partially effective in contributing to existing literature. There is, however, a need for additional research to further investigate the suggested results in this study in order to enhance the significance of the results.

10 Suggestions for further research and application

The findings in this study encourage additional research to investigate a larger population in order to enhance the significance of the results. In terms of general application, the generalisability of the RMDI and the associated methods developed for this study encourage future application in the field of RMD. The study suggests the RMDI to be applied in two manners. Firstly, companies can assess the maturity of their RMD by benchmarking to 'leading practice' identified in the RMDI. Secondly, future research may, in similar manner as in this study, apply the RMDI to place companies' RMD in relation to each other. For this purpose, both development and characteristics of RMD can be benchmarked.

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12 Appendix

Appendix A: The RMDI

Risk governance			Proxy for the importance of risk management		
1. Risk ownership 0=There is no information of a risk manager/risk board or any risk delegated position 1=There is a formal delegation of authority structure, but no risk committee or department is appointed 2=There is a formal delegation of authority structure - risk committee/board, and an individual department with department head is existent 3=The delegation of authority is in place and a Chief Risk Officer (CRO) is appointed	2. Frequency of internal risk assessment 1=Less than quarterly 2=Bi-monthly or Quarterly 3=Monthly or more often	3. Number of standardized risk management frameworks 1p per approach	4. 'Risk'-to-report length-ratio #'risk'/report length	5. Does the annual report have a separate section outlining all company risks 0=No 1=Sub-section 2= Separate section	6. Does the annual report have a separate section on risk management? 0=No 1=Sub-section 2= Separate section

Extensiveness of risk disclosure								Strategy							
7. Frequency of public reports disclosing risk management 1=Annually 2= Semi-annually 3= Quarterly	8. Disclosure of the following risks in the annual report 0 =Not included 1 =Mentioned 2 =Assigned its own sub-section 3 =Assigned its own separate section							9. Disclosed amount of potential risk impacts 0=0 impact 1=1-20 impact(s) 2=21-40 impacts 3=41-60 impacts 4=61+ impacts		10. How much of the potential risk impacts have mitigations? Mitigations/#disclosed risk impacts		11. Number of short-term strategies 0=0 strategy 1= 1-2 strategies 2=3-4 strategies 3=5-6 strategies 4=7+ strategies		12. Number of long-term strategies 0=0 strategy 1=1-10 strategies 2=11-20 strategies 3=21-30 strategies 4=31+ strategies	
	Strategic risk	Operational risk	Regulatory risk	Cybersecurity risk	Reputational risk	Environmental risk	Safety risk	Political risk	Financial	Operational	Financial	Operational			

Appendix B: Typical examples of risk impacts (KPI 9)

Company (reported year)	Risk impact example	Risk impact category
Statoil (2012)	<i>Significant changes in the tax regimes of countries in which we operate could have a material adverse effect on our liquidity and the results of our operations.</i>	Financial
Lundin (2016)	<i>Security is an important risk area for the oil and gas industry and includes potential threats such as terrorist or other attacks on people or physical assets.</i>	Non-financial
Neste (2015)	<i>The vessels chartered to Neste or owned by Neste are subject to inherent risks like maritime disaster, damage to environment and loss of, or damage to cargo and property.</i>	Both financial and non-financial

Appendix C: Typical examples of short-term strategies in annual reports (KPI 11)

Company (reported year)	Strategy
Statoil (2015)	<i>The company will step up its efficiency programme by 50% with a goal to realise USD 2.5 billion in annual savings from 2016 (pre-tax), again as measured against the cost base of 2013.</i>
Lundin (2011)	<i>Our forecast for 2012 is for production of between 32,000 and 38,000 boepd which represents an increase of five percent from 2011 if we assume the mid-point of our guidance range.</i>
Neste (2008)	<i>Ensuring the success of our capital projects will be one of our most important goals in 2009.</i>

Appendix D: Typical examples of long-term strategies in annual reports (KPI 12)

Company (reported year)	Strategy
Statoil (2013)	<i>Statoil aims to grow and enhance value through its technology-focused upstream strategy, supplemented by selective positions in the midstream and in low-carbon technologies.</i>
Lundin (2007)	<i>HSE goals of zero fatality, zero accidents and zero spills or leaks.</i>
Neste (2010)	<i>Neste Oil's goal is to use solely certified palm oil by the end of 2015.</i>

Appendix E: Example on normalisation of EBIT

EBIT is m USD 100 in 2008, the average crude oil price is USD 71 in 2008, the average crude oil price was 61 in 2007, the company reports that for +/-USD 10 in crude oil price the company will be affect +/- m USD 20 (thus unit effect is m USD 2 per USD), the company's normalised EBIT in 2008 will be:

$$EBIT_{t_{norm}} = 100 - (71 - 61) * 2 = 80$$

Chapter 12 Appendix

Appendix F: RMD scores of the three sample companies

Statoil:

	KPI												9	10	11	12			
	1	2	3	4	5	6	7	8											
2007	2	3	2	1.38	2	1	3	1	1	3	0	0	0	2	0	4	0.21	4	4
2008	2	3	2	1.26	2	2	3	1	1	3	0	1	0	2	0	4	0.18	3	3
2009	2	3	2	1.19	2	2	3	1	1	3	0	2	1	2	1	4	0.19	3	3
2010	2	3	2	1.27	2	2	3	1	1	3	0	2	2	2	2	4	0.21	2	2
2011	2	2	2	1.15	2	2	3	0	1	3	0	2	2	2	2	4	0.21	4	4
2012	2	2	2	1.00	2	2	3	0	1	3	0	2	2	2	2	3	0.18	3	3
2013	2	2	2	1.32	2	2	3	0	3	3	2	2	2	2	2	4	0.39	3	3
2014	2	2	2	1.31	2	2	2	0	3	3	2	2	2	2	2	4	0.32	3	3
2015	2	2	3	1.38	2	2	2	0	3	3	2	2	2	2	2	4	0.37	3	3
2016	2	2	3	1.28	2	2	1	0	3	3	2	2	2	2	2	4	0.39	3	3

Source: own construction

Lundin:

	KPI												9	10	11	12			
	1	2	3	4	5	6	7	8											
2007	1	0	2	1.11	1	1	3	0	2	2	0	1	1	2	1	1	0.00	2	2
2008	1	0	2	1.11	1	1	3	0	2	2	0	1	0	2	0	1	0.00	2	2
2009	1	0	2	0.96	1	1	3	0	2	2	0	1	0	2	0	1	0.00	1	2
2010	1	1	2	0.94	1	1	3	0	2	2	0	1	0	2	0	1	0.00	1	2
2011	1	1	2	1.14	1	1	3	3	3	2	0	1	1	2	1	2	1.00	1	2
2012	1	1	2	1.25	1	1	1	3	3	2	0	1	1	2	1	2	1.00	2	2
2013	1	2	2	1.24	1	1	1	3	3	2	0	1	1	2	1	2	1.00	1	2
2014	1	2	2	1.21	2	1	1	3	3	2	0	1	1	2	1	2	1.00	2	2
2015	1	2	2	1.33	2	1	1	3	3	1	2	1	1	1	0	2	1.00	3	2
2016	1	2	2	1.41	2	1	1	3	3	2	2	1	1	0	2	3	1.00	1	1

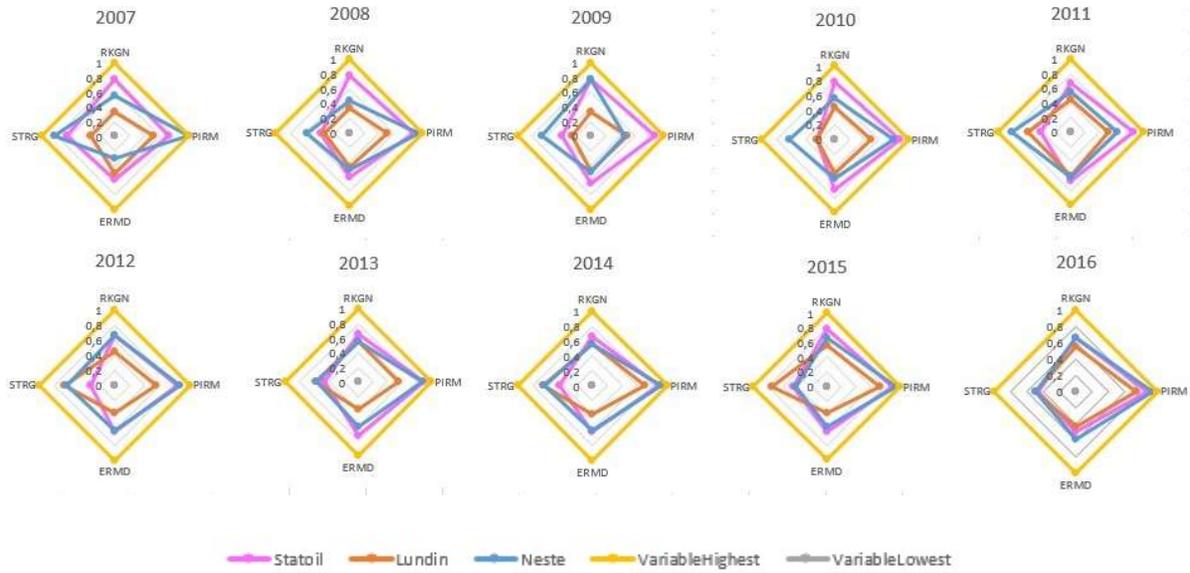
Source: own construction

Neste

	KPI												9	10	11	12			
	1	2	3	4	5	6	7	8											
2007	2	2	1	1.98	2	2	1	3	3	1	1	1	1	0	1	1	1.00	3	3
2008	2	1	1	1.66	2	2	3	2	2	1	1	1	1	0	1	1	1.00	1	2
2009	3	2	2	1.77	0	1	3	1	1	1	0	1	2	1	1	1	1.00	3	2
2010	3	0	2	1.76	1	2	3	1	1	1	1	1	3	1	3	1	0.63	1	4
2011	3	0	2	0.85	1	2	3	3	1	1	1	2	3	1	3	2	0.92	4	2
2012	3	1	2	1.22	2	2	3	3	1	1	1	1	3	1	3	2	0.92	2	2
2013	2	1	2	1.217	2	2	3	3	1	1	1	1	3	1	3	2	0.92	1	2
2014	2	1	2	1.471	2	2	3	2	1	1	1	1	3	1	3	2	0.92	2	2
2015	2	1	3	1.701	2	2	3	2	1	2	0	0	3	2	3	1	0.54	2	1
2016	2	1	3	1.672	2	2	3	2	1	2	2	1	3	2	3	1	0.47	2	2

Source: own construction

Appendix G: Companies' RMD profiles, 2007-2016



Appendix H: interviewees and the inputs used for analysis

Name	Job position	Expertise area	Key words	Documentation
Espen Norheim	Partner in Transaction Advisory Services, EY, Norway	Oilfield service sector, oil operations	Operational , role of the oil prices, operational risks, upstream, midstream, downstream, KPI's	Recorded audio file
Lars Ragnar Vigdel	Partner and head of Financial Accounting Advisory Services (FAAS), Norway	Accounting treatment in oil industry	Risk disclosure, risk requirements, KPI's	Recorded audio file
Lars Topholm	Equity analyst, Carnegie Investment Bank	Review of annual reports, valuation	Multiples, value creation, risk disclosure in annual reports	Written transcribed

Source: Own construction

Appendix I: Transcript with Lars Topholm

Holly: We are trying to investigate whether risk management disclosure actually adds value for companies. Do you think it is possible?

Lars: To be honest, no equity analyst reads the risk chapter in the annual report. We basically go straight to the financials and then browse over the strategies when making our recommendation.

Holly: So you do not even read it afterwards when you have had better time to read through the reports?

Lars: No, it does not give me any information I need to make a stock recommendation.

Holly: OK, so you do not think RMD really matters? That it is just a procedure that does not add any real value?

Lars: Well, not necessarily. You could argue that by disclosing more information on risk, companies signals that they are more aware of their risk environment and can thereby better control their risks. This definitely adds value to the company if that is true.

Holly: We are trying to investigate correlations between our RMD scores that we have given companies, with another value measurements. What do you think about using stock price?

Lars: Stock prices are influenced by thousands of factors. A company's fundamental value lays within its ability to generate cash from its operations. So I would recommend to look into operational earnings or a valuation using EV/EBIT for example. You can try to see which seems more reasonable. I would assume that if a company is good at managing its risks, then it would keep its operating earnings in a positive development. So EBIT would probably make more sense to look at.

Holly: Great, thank you! So stock prices is useless in this case? You would not expect RMD to have any influence on the stock prices after the publication of annual reports?

Lars: Well, it is definitely not the deciding factor for the effect on the stock market after an annual report being published. The market often reacts based on the disclosed financials immediately after the publication, and is often followed by a backlash. It is still the financials we are interested in. But if we go back to my earlier argument, by disclosing more risks, companies are probably more aware of their risks and can thereby better control them. Then that should be reflected in the financials,

which will also effect the share price. I could imagine there is a correlation between RMD and share price then.

Holly: I see, so operational earnings should be an indicator of how good the company is at managing risk?

Lars: I would say so yes, but whether they actually disclose the risk management that they apply, is not for sure. Most of the time, companies probably just copy what they did last year and report that. So that does not say much.

Holly: Yes, we are aware of that. However, we assume that the annual report is the main vehicle towards the stakeholders.

Lars: We use annual reports to make our initial recommendations, but the 'real' recommendation comes after we have talked with investor relations.

Holly: From existing literature, we have read that RMD gains investor confidence and that would influence the stock prices positively. Do you think this is correct in practice?

Lars: Again, no one really reads the risk chapter.

Holly: But do you read the strategies and company outlook? Literature says that strategies are derived from risks, both good and bad. Companies are able to create their strategies only by identifying company's risk environment and opportunities.

Lars: Yes that makes sense. I could imagine RMD to have an indirect effect on the stock prices. Again, it is influenced by so many factors. But you can test it out. I would not be surprised by any of the outcomes.

Holly: Alright. Thank you so much for your time.