The Effect of the Adoption of Enterprise Risk Management on Firm Value: Evidence from North American Energy and Natural Resources Sector

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This research was undertaken under the auspices of
London School of Commerce

Submitted in partial fulfilment for the award of the degree of Doctor of
Business Administration

University of Wales Trinity Saint David

2020

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Abstract

The failure of traditional risk management (TRM) during the 2008 financial crisis has led to the evolution of enterprise risk management (ERM) with a new integrative approach that seeks to manage risks holistically. ERM has attracted the interest of scholars, practitioners and many companies that started implementing the programme. Despite the increased attention on ERM, evidence on its effect on firm value is controversial. Another critical issue is the absence of information on the firm's characteristics associated with its implementation. This study aims to examine the value of ERM programme and to investigate the influential factors that lead to its successful deployment. Considering that previous studies mainly targeted the insurance and financial service industry, the current research focuses on the North American energy and natural resources sector, which has received little attention in the literature. Unlike many studies that identified ERM adoption using secondary data and keyword search, this study used a comprehensive survey to obtain these data directly from the firms. The study also used the survey tool to collect data about ERM influential factors such as the presence of Chief Risk Officer (CRO), the board of directors monitoring and big four audit firms. Other research variables such as firm value proxy (Tobin's Q) and some control variables (such as leverage, firm size, institutional ownership, sales growth and dividends) has been collected from annual reports and financial databases. The data of ERM and firm value model were analysed using Stepwise Multiple Regression. While data on ERM implementation determinants were analysed using Ordinal Logistic Regression. Based on the cross-sectional data collected from 137 organisations in six months, the study found a positive and significant relationship between ERM and firm value. Further, the ERM implementation determinants' results indicated a positives relationship between boards of directors monitoring, CRO, risk culture, and an upper ERM implementation stage. Unexpectedly, the study found a significant negative relationship between leverage and ERM deployment in the firms. These findings suggest several courses of

action for C-suite executives at the North American energy and natural resources publicly traded firms, ERM implementers, risk culture policymakers, regulatory bodies and governments.

The principal contribution of this study is that it support the Value Maximisation Theory and provides a strong empirical confirmation about the value of ERM. Secondly, the findings of the study provide a clearer insight into the factors which influence ERM successful implementation. Thirdly this research used a quantitative multimethod design which has not been identified before in ERM literature. Fourthly, the study used a highly reliable ERM measurement tool compared to the previous studies, which mainly used secondary data. Finally, this research is first of a kind in studying the value of ERM in the energy and natural resources sector in North America. In terms of future work, it would be interesting to repeat the experiments used in this research using a sample from a different industry with a particular focus on the COVID19 period.

Acknowledgement

I would like to express my deepest appreciation to all the people who have supported me throughout my DBA.

Firstly and foremost, I would like to express my sincere gratitude to my supervisor Professor Paul Reynolds for his patience, encouragement and continuous support throughout my research. Without his guidance and constant feedback, this DBA would not have been achievable. I would also like to extend my sincere thanks to Dr David Chitakunye, for his practical suggestions, valuable advice and many insightful discussions.

I would also like to acknowledge the help of my survey participant from the North American energy and natural resources listed companies for their effort in completing the survey.

Lastly, I would like to thank my family for all their love. I am especially grateful to my parents, who supported me emotionally and financially. Thank you, my dad, Ghaleb Kinyar, my mum, Layla Issa Kinyar, my beautiful sisters Rania and Rola and my intelligent brother Moe for always believing in me and for inspiring me to follow my dreams.

Contents

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List of Abbreviations

AAA	The American Accountants Associations
AICPCU	American Institute for Chartered Property and Casualty Underwriters
AIG	American International Group
AIPA	The American Institute of Public Accountants
AIRMIC	Association of Insurance and Risk Managers in Industry and Commerce
1B	One Billion
BCF/D	Billion Cubic Feet Per Day
CAS	Casualty Actuarial Society
CCAF	Canadian Comprehensive Auditing Foundation
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CICA	Canadian Institute of Chartered Accountants
COSO	Committee of Sponsoring Organisations of the Treadway Commission
CRO	Chief Risk Officer
C-Suite	Top Senior Executives
ERM	Enterprise Risk Management
FEI	Financial Executives International
HBOS	Halifax Bank of Scotland
HM Treasury	Her Majesty's Treasury
IIA	The Institute of Internal Auditors
IMA	Institute of Management Accountants
IMF	International Monetary Fund
IRGC	International Risk Governance Council
IRM	The Institute of Risk Management
ISO	International Organisation for Standardisation
LSE	London Stock Exchange
MIL-STD	United States Military Standard
MMBPD	Million Barrels of Oil Per Day
Moody	Moody's Investor Service, Inc.

NCSU	North Carolina State University
NYSE	New York Stock Exchange
OECD	Organisation for Economic Co-operation and Development
OPEC	The Organization of the Petroleum Exporting Countries
RIMS	Risk and Insurance Management Society
RM	Risk Management
RMM	Risk Maturity Model
ROA	Return on Assets
ROE	Return of Equity
S&P	Standard and Poor's
SEC	Securities and Exchange Commission
SOX	Sarbanes-Oxley Act
TRM	Traditional Risk Management
TSX	Toronto Stock Exchange
UGG	United Grains Growers
UK	United Kingdom
US	United States of America

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Chapter One
Introduction

1.1 Introduction

Over the last few decades, business operations have been more complex and uncertain compared to the past. The challenges that are facing companies are larger, and risk exposure is higher, which is hindering performance and keeping investors on hold from investing in new projects. During the 2008 financial crisis, many organisations experienced significant losses. The crisis led to the bankruptcy of large banks like Lehman Brothers ($ 691B assets) and Washington Mutual ($ 328B assets), in addition to a fear of a collapse in other financial institutions like Citi Group, AIG, and HBOS (see Zingales, 2008; Taran et al., 2013; Peck, 2016)

Another sector which faced high financial distress during the crisis is the energy and natural resources sector. For instance, oil prices had dropped over two-third due to the decline in oil demand and low economic activity (Hoyos, 2010; Baffes, 2015). The dry-up of investments led to many delays and cancellations in oil projects due to the lack of cash flows which usually fund most of the energy projects. It has been estimated that the global upstream oil and gas investment budget had been reduced by more than 21 % in 2009 compared to 2008, a cut down of almost $100B (Khamis, 2010; OECD, 2011). Between October 2008 and May 2009, more than 25 planned oil and gas projects that worth more than $170B involving over two mbd/d of oil production capacity, and more than 2.2 bcf/d capacity of gas, had been left on hold or cancelled (OECD,2009).

The consequences of the 2008 financial crisis led to an increased rapid advance in the field of risk management, which became a subject of many systematic investigations (see Musyoki, 2017; Gregson, 2019). Many organisations started implementing ERM programs instead of

their traditional silos risk management; universities have created ERM courses and established research centres for ERM research. Unlike traditional risk management, which categorises and manages risks separately (Hoyt et al., 2008; Iulia, 2014), ERM assesses and manages the entire risk portfolio of the organisation in a holistic approach. According to many in the field, companies that have a complete ERM programme in place, have more control on their stock price volatility, a lower capital cost of their firms and higher capital efficiency (Cumming and Hertle, 2001; Lam, 2001; Miccolis and Shah, 2008; Eckles, 2014; Aljami, 2019). More generally, ERM enhances firm risk awareness, which translates into a more effective decision-making process and better overall business operations.

Despite the increase in scholars' attention in ERM, evidence on its effect on firm value is controversial and much less is known about the firm characteristics associated with its adoption. Also, identifying firms that implemented an ERM programme is still considered one of the main critical challenges in ERM literature. The reason behind this difficulty in identifying ERM adoption is because most companies do not publicly disclose the types of their risk management practices and whether they manage their risks in silos or using an integrative approach. Therefore, some scholars like Liebenberg and Hoyt (2003), researched Lexis-Nexis and other financial databases, for announcements of hiring Chief Risk Officers as evidence of ERM adoption (see also Eikenhout, 2015). Other studies used Standards and Poor's ratings (see, McShane et al., 2011; Liao and Shin, 2012; Boehlert et al., 2018). While the vast majority performed a keyword search in companies' annual reports, press releases and businesses databases for evidence of ERM functions (Pagach and Warr, 2010; Tahir & Razali 2011; Lin et al., 2012; Silva et al., 2019; Lun Chen., 2019). Most of these methods have been severely criticised for lack of accuracy.

Further, most of the previous studies mainly focused on the insurance and financial services sector, leaving other sectors unclear about the benefits of ERM for their firms. Therefore, this study addresses this gap by developing a comprehensive survey tool which has been sent to 392 North American energy and natural resource companies listed in NYSE and NASDAQ. The purpose of the survey is to identify the stage of ERM implementation in the firms and to collect other critical information such as the driver of ERM adoption in this sector. The study aims to come up with clear numerical results that will indicate the effect of implementing ERM programme on firm value, and the firm characteristics associated with its implementation.

1.2 Overview of Enterprise Risk Management and Its Effect on Firm Value

The last two decades have seen a growing trend towards the concept of enterprise risk management and its implications on firm performance (Pooster, 2012). Unlike the silos based traditional risk management, ERM operates in a systematic approach which aggregates all the interrelated risks across the organisation in one portfolio. ERM thus allow firms to group all their risks into classes and hedge the residual risks. This method is considered more effective and value maximising compared to managing each risk independently (see, e. g., Hoyt and Liebenberg, 2011; Ai et al., 2016; Bohnert et al., 2017). Considering the concept of portfolio theory, ERM creates more value, as the sum of the aggregated portfolio is lower than the sum of the individual risks, in case the risks are not fully correspondent and correlated (Beasley, Pagach and War, 2008).

In a call for ERM research that emphasises on the importance of managing risks comprehensively, Stulz, (1996) suggested that risk management theory should develop beyond its traditional objective "variance minimisation''; or risk allocation. In his pioneering study "Rethinking risk management" (Stulz,1996), he postulated that a firm should not reduce its exposure to all-risk typologies, in contrast, companies should reduce risk exposures in areas where they have no comparative advantage, and exploit it in areas where they do. Similarly,

Schrand and Unal (1998) suggested that risk managers should coordinate their risk management activities, while Colquitt et al. (1999) advocated for "integrated risk management".

This holistic risk management approach and its alignment with the organisation corporate's strategy is expected to create shareholders value (Hoyt and Liebenberg 2011; Farrell and Gallagher, 2015; Bohnert et al., 2017). Due to the ability of ERM to manage the entire risk portfolio of the firm integratively, those who have an ERM programme in place are capable of absorbing a tremendous amount of risks compared to other firms' activities (Bohnert et al., 2017). This approach enables the firms to gain competitive advantages by maximising a firm's risk-return-trade-off (Meulbroek, 2002; Nocco and Stulz, 2006; Farrell and Gallagher, 2015; Lechner and Gatzert, 2017).

1.3 Enterprise Risk Management in the US

Over the last decade, the business environment in the US has been volatile. This instability in the operating environment has been attributed to several factors such as new emerging risks, new regulations and the increased intensity of regulatory scrutinies. These challenges placed ERM implementation on the top priorities of the US firms (NYSE, 2014).

According to NYSE corporate governance announcement (NYSE, 2014), organisations that either has an ERM programme in place or currently working on improving the maturity level of their programme can manage their firm's risks effectively. Further, ERM enables firms to enhance their decision-making process and increase their confidence in dealing with the regulatory inspection. Besides, it helps firms to meet the expectation of their shareholders, rating agencies and board of directors (NYSE, 2014; KPMG, 2015). The NYSE suggested that achieving an effective ERM programme requires the following factors: (1) a senior executive

to oversee ERM and to influence the firm risk culture, (2) effective corporate governance, (3) ERM implementation drivers, (4) enhanced communication and change management.

In addition to NYSE pressure on US firms to adopt ERM, credit rating agencies like Moody's and Standard & Poor's (S&P) have started to assess firms' risk management activities as a part of their rating analysis (see, Paape and Spekle, 2012). For example, S&P's evaluates insurance firms on weather their ERM programme operate systematically all over the enterprise. It also assesses the ability of ERM to control risks and support firms in achieving their strategic objectives (S&P's, 2019). Based on the evaluation results, S&P's score the insurer as Deficient, Adequate, Good, Strong or Superior.

In Canada, Toronto stock exchange guidelines (TSX Guidelines, 2017) announced that identifying risks facing the firms and ensuring a successful implementation of Enterprise-wide risk management is considered one of the main duties of the board, through the audit committee or risk committee.

The emergence of these new regulations for improving risk management in US firms led to considerable growth in ERM literature. In addition, many ERM scholars began focusing their studies on North America and particularly on the insurance industry (Beasley et al., 2005; Brancato et al., 2006; Hoyt et al., 2008; McShane, 2011; Liebenberg and Hoyt, 2011; Desender, 2011; Nair et al., 2014; Grace et al., 2015; Walker, 2015; Ai et al., 2016). Even though many studies examined ERM in North America, yet there is a paucity of evidence on ERM in the energy and natural resources sector in this region.

Therefore the main purpose of conducting this study is to identify the users of ERM in the North American energy and resources sector and to examine the effect of its adoption on firm value. The results of this study have a number of implications for regulars, rating agencies and managers in North American energy and natural resources firms.

1.4 Research Problem

Risk management has become one of the most critical concerns all over the globe since the beginning of the twenty-one century. Risk arose from different sources such as natural hazards (Indonesia: Earthquake and Tsunami, 2018; Greece Wildfire, 2018; Australian bushfires 2019), financial risks (Enron scandal; 2001; the great financial crisis, 2008, 2009) and global pandemics (EBOLA; H1N1; COVID 19). These events led to extensive losses in lives and the economy. The academic literature has identified several risks directly attributed to risk management. One is the BP spill which belongs to the energy sector (Wu, 2015). BP spill was considered the worst disaster in the history of the US, which lasted for more than 87 days, killed 11 employees, and killed millions of wild sea animals, and forced fishing and tourism to shutter (Grant, 2017). Secondly is the 2008, 2009 crash in the US real estate market, which is linked to the great financial crisis (Sabato, 2010). Thirdly, financial scandals like Enron & World Com (Jalal et al., 2011). The Consequences of these events were not limited to their countries of origins. However, they spread globally because of globalisation.

Due to the economic instability during the past years, ERM has alone become one of the most popular topics in business research. The academic literature on ERM is mainly divided into two groups. A group that mainly addressed the research question whether ERM implementation creates value for the firms (see, e. g., Hoyt and Liebenberg, 2008, 2011; Beasley et al., 2008; Gordon et al., 2009; Pagach and Warr, 2010; McShane et al., 2011; Tahir and Razali, 2011; Lin et al., 2012; Quon et al., 2012; Baxter et al., 2013; Wu et al., 2014; Nair et al., 2014; Farrell and Gallagher, 2015; Grace et al., 2015; Sekerci, 2015; Agustina and Baroroh, 2016; Bohnert et al., 2017; Phan et al., 2020; Malik, 2020). While the second group mainly investigated firm characteristics associate with the implementation of the ERM programme; or as many scholars referred to it in the literature, "the determinants of ERM successful implementation" (see, e. g., Liebenberg and Hoyt, 2003; Beasley et al., 2005; Desender, 2011; Pagach and Warr, 2011;

Razali et al., 2011; Golshan and Rasid, 2012; Ganesh and Kanahai, 2014; Farrell and Gallagher, 2015; Sekerci, 2015; Ai et al., 2016; Mardessi and Daoud, 2017; Bohnert et al., 2017; Lechner and Gatzert, 2017).

Despite the extensive amount of published literature on ERM and its effect on firm value, the overwhelming majority of studies used a sample of financial services and insurance companies (see Hoyt and Liebenberg, 2008; Pagach and Warr, 2010; Acharyya, 2008; Hoyt and Khang, 2000; Kleffner and Lee, 2003). In addition, their findings regarding ERM contribution to shareholders value creation and firm performance were mixed. Similarly, studies on firm characteristics associated with ERM implementation were controversial and limited to targeting the financial sector. The ambiguousness of findings on the value of ERM and its implementation determinants is affecting its progress negatively. While many firms that belong to the energy and natural resources sector may have set ERM deployment initiatives, the scarcity of information about ERM drivers in this particular sector could obstruct its implementation. This study aims to address this issue in ERM literature.

The present study adds to the growing body of research on ERM by examining its driver and value in the North American energy and natural resources sector. Given that this research is one of the first attempts to examine ERM in this sector thoroughly, it makes several noteworthy contributions to theory and practice.

1.5 The Research Aim
To address the knowledge gap in ERM literature, this study aims to examine the effect of ERM adoption on firm value and to investigate the determinants of ERM implementation in the North American energy and natural resources publicly traded firms.

1.6 Research Objectives
TRM commonly focuses on pure risks (hazards) and refers to individual risks as if they do not react, which may lead to duplication in risk mitigation efforts, and insufficient sharing of risk

information across the organisation. In contrast, ERM is a fully integrated risk management approach characterised by its ability to identify and manage entity-wide risks and reduce performance variability. Thus firms that have an ERM programme in place can sustain and improve firm value.

Therefore, an increase in ERM adoption in the corporate world, especially in the energy and natural resources sector which is highly exposed to various risks types (financial and non-financial risks), could help firms to achieve their objectives and enhance their corporate performance. However, the empirical results of previous studies on the effect of ERM on firm value are controversial. This lack of understanding of the value of ERM may slow the programme development. This study aims to address this gap in the literature and provide clear empirical results on this aspect using a sample of 392 energy and natural resources companies listed in NYSE and NASDAQ. Moreover, the study uses a new measurement tool for identifying ERM implementation in the firms.

This study aims to examine the effect of ERM adoption on firm value and to discover the determinants of ERM implementation in the North American energy and natural resources firms.

1.6.1 The Study Objectives

1. To measure the level of ERM implementation in the North American energy and natural resources publicly traded companies.

2. To investigate the effect of the adoption of enterprise risk management on firm value in the North American energy and natural resources publicly traded companies.

3. To examine the firms' characteristics that influence ERM implementation in the North American energy and natural resources publicly traded companies.

4. To determine the effect of the firms' risk culture on ERM implementation stage in the North American energy and natural resources publicly traded companies.

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1.7 Research Questions

After studying the ERM literature, many gaps have been identified in different areas. The effect of ERM on firm value had been mainly investigated in the insurance and banking industry with little attention on the energy and natural resources sector. Further, many previous ERM studies were subject to several limitations, such as the use of secondary data for identifying ERM adopting firms. Also, there is a paucity of information about the influence of risk culture and other drivers on ERM implementation stage in the energy and natural resources sector. Thereby, the following research question is formulated to fill the gap in ERM literature.

1.7.1 The Research Questions of the Study

1. What is the current ERM implementation stage in the North American energy and natural resources publicly traded companies?

2. Does the implementation of ERM in the North American energy and natural resources publicly traded companies positively affect their firm value?

3. What are the firm's characteristics associated with ERM implementation in the North American energy and natural resources publicly traded companies?

4. Does the organisations' risk culture significantly influence the level of ERM deployment in the North American energy and natural resources publicly traded companies?

1.8 Research Methodology and Data Collection

This study has been conducted using a quantitative multimethod technique. In order to address the research questions, the following steps have been followed:

1. The first phase in this study consists of an empirical review of the risk management literature. The literature review starts by reviewing the concept of traditional risk management theories and the evolution of enterprise risk management. Next, the literature review examines the most

popular ERM frameworks (COSO, ISO, S&P) and their benefits to the public listed companies. One of the main objectives of reviewing the literature is to find a reliable measurement tool for identifying ERM implementation state in the North American energy and natural resources sector. Building on the seminal work of Beasley et al. (2005) as well as other studies in the same area, the survey tool of this study is developed. The survey aims to investigate the current state of ERM in the energy and natural resources companies listed in NYSE and NASDAQ. In addition, it provides an insight into the main drivers of ERM successful implementation in this sector.

2. The next step is choosing an adequate sample size that allows an appropriate statistical power and generalisability of results. While the majority of previous ERM studied mainly focused on the financial sector in the US, this study favours the non-financial sector. Therefore the sample size in this study is all the 392 energy and natural resources companies listed in NYSE and NASDAQ.

3. In the third phase, the survey tool is constructed, and the item related to measuring ERM implementation is adopted from Beasley et al. (2005). Furthermore, the survey items are tested for validity using pre-testing and pilot testing. The reliability of the measurement items is tested using Cronbach's alpha.

4. This stage includes the data collection of the study. Data related to ERM stage and some ERM influential factors are collected using Survey Monkey. All other variables, including the dependent variable (Tobin's Q) and the control variables of the study, were collected from the annual reports and Y-Charts. The control variables of the study have been chosen based on previous ERM studies.

5. The data analysis part is divided into two main sections. The first sections include descriptive statistics for ERM and firm value equation. In addition to descriptive statistics, Pearson

correlation analysis has been used to examine the explanatory power of the variables and the correlation between them. In order to investigate the effect of ERM on firm value, a stepwise regression analysis has been employed. Similarly, the second section starts with descriptive statistics of ERM influential factors, followed by the Pearson correlation coefficient and ordinal logistic regression. The study's conceptual framework is listed in section 2.15 of the literature review (see figure 2.8).

1.9 Significance of the Study

Board of directors' pressure, unstable markets, intense market rivalry, regulatory scrutiny and other dynamic risks are leading to increasing calls for implementing effective risk management programmes in the US organisations (Protiviti, 2018). In their six edition survey, Protiviti and NC State University examined the top risks facing the energy industry in the US. They found that the regulatory risks and regulatory inspections are perceived as the top risks for the organisations in this sector. In addition, a large number of respondents stated that organisation culture is also considered as one of their most critical risks. Despite this high-risk exposure facing the industry, the survey found that only recently, the energy firms started taking serious ERM initiatives (Protiviti, 2018).

Similarly, Paul Walker (2015) conducted a survey study to examine the current state of enterprise risk management in 100 North American energy companies. One of the key findings of his survey is that companies in this industry are experiencing an increase in emerging risk and some risk surprises. Although the survey found that many firms have some ERM practices, yet there is plenty of room for improvement in their risk management approach.

The current study believes that this slow development of ERM adoption in the energy sector is due to several factors. First, ERM implementation is very costly, and firms are not clear whether investing in ERM will increase their shareholder's value. Secondly, there is a lack of

empirical evidence about the driver of ERM successful implementation in the energy sector. This study addresses these issues using a sample of 392 energy and natural resources companies listed in NYSE and NASDAQ. The findings will fill this gap in knowledge and will provide a significant contribution to stakeholders in this sector, including:

- Regulatory bodies, rating agencies, and policymakers.

- Practitioners in the energy and natural resources industry, including senior managers and C-suite executives.

- Investors and other stakeholders.

- ERM Academics, ERM consultants and ERM implementers.

- Risk culture policymakers.

Also, this study used two data collection techniques, the online survey and the secondary data collection. This methodology has an advantage over those of previous studies which mainly relied on secondary data for examining ERM states in the firms. Further, the study has posted many questions in need of further investigation. Therefore, this research provides several directions for future ERM studies.

1.10 Scope of the Study

The world economy has seen the worst economic downturn since the great financial crisis due to COVID 19 lockdown (see IMF, 2020; Deloitte, 2020). In the United States, the budget deficit in 2020 is estimated to reach 18% of GDP, a figure which has been seen only during World War II in the 1940s. While traditional risk management has proven its insufficiency during crisis periods (see Mitton, 2002; Jin, 2001; AIG, 2010; Deloitte, 2014, 2015, 2018), ERM has been advocated as a solution for this problem. Nevertheless, evidence about the value of ERM is still controversial in the literature. Also, there is a lack of understanding of the influential factors that lead to ERM successful implementation in the firms. This ambiguity is hindering ERM development. The current study aims to examine the effect of ERM on firm value and to

discover the determinants of ERM successful implementation. While the majority of previous studies used a sample of US insurance companies, this study focuses on the North American energy and natural resources industry. Knowing that targeting the whole population of a specific sector in a particular region is a common practice in ERM studies (Li et al., 2013; Muthuveloo and Ping, 2015; Sithipolvanichgul, 2016; Phan, 2020), the target population of this research is all the energy and natural resources firms listed in New York Stock Exchange and NASDAQ. The total number of firms is 392 companies.

This study used both primary and secondary data. An online survey has been employed to collect data about the current state of ERM in the firms. The primary target respondents of the survey are CEOs, CFOs and CROs; however other firm members such as risk managers, finance manager or any senior risk management members have been welcomed to participate in the survey. The data of other variables such as firm value (Tobin's Q) and the control variable were collected from annual reports and Y-Charts (financial database). This study helps in understanding the state of ERM in the North American energy and natural resources sector. The structure of the thesis is provided below (1.11).

1.11 Thesis Structure

This research is divided into seven chapters that proceed as the following:

1. Chapter one: This thesis consists of seven chapters. The first chapter is an introduction. The chapter includes the study background and its significance as well as the problem, research objectives and research questions.

2. Chapters two: This chapter includes an overview of risk typologies and risk management. The chapter also reviews the difference between traditional risk management and ERM concept. The various definitions of ERM and its frameworks are also included. Besides, the previous literature on the value of ERM and its implementation drivers are reviewed. This

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chapter helped in developing the survey items and in identifying the most appropriate variables for the study.

3. Chapter three: This chapter explains the research design and methodology of the thesis. The first section started by providing the rationale for using the positivist's research paradigm. The chapter then describes the methodological choice for addressing the research objectives. The survey tool and its items for measuring ERM implementation stage are also presented and justified. Further, the regression assumption of ERM and firm value is clearly stated, followed by the regression assumption of ERM influential factors. The conceptual models of both assumptions are constructed and explained in details. Finally, the data treatment and the statistical analysis techniques are briefly explained.

4. Chapter four: This chapter presents the survey results about the current state of ERM in the North American energy and natural resources companies. The survey results provide an insight into the stage of ERM implementation in the participant's organisations and the maturity level of their ERM programmes. The findings also include evidence about the drivers of ERM adoption in this sector.

5. Chapter five: In this chapter, the data of the survey results are coded and entered to IBM SPSS along with other data that has been collected from secondary sources. The data analysis of ERM and firm value model are computed using stepwise regression and other statistical tools; the data of the determinants of ERM are analysed using ordinal logistic regression and other data analysis techniques.

6. Chapter six: This chapter is the discussion of the research results. It begins by restating the research objectives. The finding of ERM and firm value model are then discussed against the literature, and the implication of each outcome is clearly stated. Likewise, findings of ERM

determinants are discussed against the results of previous studies, and the implications of findings are stated.

7. Chapter seven: This chapter is the conclusion of the study. It explains how the study met its initial objectives. The chapter also states the contribution for both theory and practice, recommendations for policy, limitation and suggestions for future studies.

1.12 Summary

This chapter starts with a background on Enterprise Risk Management concept and its relationship with firm value creation. Next, it presents the research problem and the motivation of the study. The research aim, objectives and question are also outlined and explained. It also states the research methodology and the data collection process as well as the significance and the scope of the study. The conceptual model of the research and the thesis structure is also provided.

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Chapter Two
Literature Review

2.1 Introduction

This chapter is divided into four sections. The first section starts by explaining the concepts of risk and risk management by looking at various definitions and theories around the subject. The latter part of this section expands to review the published literature on traditional risk management (TRM).

Since the 1950s, risk management has been highly debated, and its effect on firm value has been discussed since 1958 when Modigliani and Miller's (1958) first stated that risk management does not affect firm value under perfect market condition. After Miller's study, some TRM scholars argued that market imperfections are the main reason behind risk management -existence because it minimises risk costs (Bertinetti et al., 2013). TRM is defined as a programme that manages risks separately, and it mainly focuses on pure risk and speculative risks (Dionne, 2013; Ogutu et al., 2018). Pure risk is defined as risks that have damage or no damage. Examples of pure risk are hazards like fires at workplaces or natural disasters. Organisations can insure these types of risks. In comparison, speculative risks are those that may have different outcomes such as loss, profit or status quo. For instance, loss in investment due to stock market fluctuation is considered a speculative risk (Ogutu et al., 2018). The traditional risk management approach uses two main strategies for tackling risks, corporate hedging (using derivatives) and corporate insurance. Several studies found that traditional risk management strategies support firm value (see Junior and Laham, 2008; Allayannis et al., 2012; Gilje and Taillard, 2017; Bachiller et al., 2020), which provided an insight on why firm's hedge their risks. On the other hand, many recent studies reported contradicting results (Jin and Jorion, 2007; Khediri et al., 2010; Ahmed et al., 2014; Altuntas, Liebenberg and Watson, 2017; Guney et al., 2020).

The second section of this chapter covers enterprise risk management evolution, definitions, and frameworks.

The great financial crisis that occurred in 2008 and led to the collapse of huge companies, primarily in the financial services industry, has been attributed to the inefficiency of traditional risk management programmes (see Kirkpatrick, 2009). This dilemma made ERM receive much interest from many academics, corporate professionals and regulatory bodies. Unlike the silo-based traditional risk management approach, ERM manages firms risks holistically (Schroeder and Jackson, 2007). According to proponents of ERM, managing risks holistically allows firms to integrate risk management decisions and to reduce costs resulting from duplications in risk mitigations (see Moeller, 2014; Hoyt and Liebenberg, 2015; McCabe and Petersson, 2017). Moreover, Firms that have an ERM programme in place have a higher chance to identify risk inherent in diverse business functions. Thus firms will be able to allocate their capital more efficiently (Hoyt and Liebenberg, 2015). Another advantage of ERM adoption is that it enables firms to make more effective investments decisions based on more precise expectations about their risk-adjusted rates of return. These accurate investments will allow firms to create sustainable shareholder value (Meulbroek, 2002; Hoyt and Liebenberg, 2015; Bohnert et al., 2017). The last part of this chapter examines the previous empirical studies that have been conducted on ERM. There are a large number of published studies on the effect of ERM on firm value in the literature (see, e. g., Beasley et al., 2008; Gordon et al., 2009; Pagach and Warr, 2010; McShane et al., 2011; Tahir and Razali, 2011; Lin et al., 2012; Quon et al., 2012; Baxter et al., 2013; Nair et al., 2014; Grace et al., 2015; Sekerci, 2015; Agustina and Baroroh, 2016; Bohnert et al., 2017; Phan et al., 2020). Similarly, many scholars investigated the determinants of ERM implementation (Desender, 2011; Pagach and Warr, 2011; Razali et al., 2011; Golshan and Rasid, 2012; Ganesh and Kanahai, 2014; Farrell and Gallagher, 2015; Sekerci, 2015; Ai et al., 2016; Mardessi and Daoud, 2017; Bohnert et al., 2017; Lechner and

Gatzert, 2017). Nevertheless, evidence on the value of ERM has been mixed, and the causal factors leading to ERM successful implementation remains speculative. One of the main reason behind these unclear results is the difficulty in identifying firms that adopted ERM. Therefore this section in the literature begins by critically reviewing all the previous methods used for measuring ERM implementation, such as keyword search, S&P's scoring and the presence of Chief Risk Officer.

The last section is the chapter conclusion.

2.2 Risks and Risk Management

2.2.1 The Definition of "Risk"

Although the word risk has been used extensively in business and finance literature, a common agreement on its definition and interpretation is not available yet (Aven, 2011). Some authors defined it based on probabilities; others defined it based on the expected value of return, and few others linked risk with uncertainty. This inconsistency in the definition of the word risk is not necessarily problematic, in which some industries have different perceptions regarding its meanings. Therefore, Kaplan (1997) suggested that each scholar should define and explain the meaning of the word risk in his/her research context.

The Oxford English Dictionary (2016) defines "risk" as: "a situation involving exposure to danger", and Cambridge English Dictionary (2008) defines it as "the possibility that something bad or dangerous will happen". Similarly, Webster's Dictionary (2013) defines risk as the "possibility of loss or injury or someone or something that creates or suggests a hazard". Thus English dictionaries associated risk with adverse events.

Given the lack of a standard interpretation for the word risk, this chapter starts by reviewing the literature for identifying a risk definition suitable for its context. The following list is an overview of risk definitions in chronological order:

1. Risk is an integration of five different sources: consequence, probability of occurrence, significance, causal scenario and population affected (Kumamoto & Henley, 1996).

2. Risk is a condition or an incident where something of human value is put on a stake and where the consequences are uncertain (Rosa, 1998).

3. Risk is the expression of impact and potential of an accident, in the sense of the severity of the possible accident and the likelihood of the event (MIL-STD-882D, 2000).

4. Risk is a combination of probability and the extent of its outcomes (ISO, 2002).

5. Risk is an uncertain outcome of an accident or a situation related to something of human values (IRGC, 2005).

6. Risk is the probability of injury, illness, or harm to an employee due to work or natural hazards. (Law of health and safety at work, 2005).

7. Risk equals anticipated damage or harm (Campbell, 2005).

8. Risk refers to the lack of information about the level of danger and severity of an incident and its outcomes on human values (Avenn and Renn, 2009).

Unlike many scholars who consider risks only as a threat, Hampton (2009) defined it as the possibility that current results do not meet the expected outcomes. Hampton (2009) classified risks into two main categories:

1. Variability: The expected result from the business objective may not match with the plan, project deadline, or even the budget of the project or operation.

2. Upside risk: the result of the incident is better than expected, which is considered an opportunity.

In addition to the scholarly definitions of risk, many organisations provided their own explanation. For instance, HM Treasury (2004) defined risks as "the uncertainty of an outcome, within a range of exposure. This arises from a combination of the impact and the probability

of potential events." ISO 31000 (2009) defined risk as "the consequence of uncertainty on objectives". This definition is commonly cited in ERM literature.

On the other hand, the Institute of Risk Management (IRM, 2002) considers risk as "the combination of the probability of an event and its consequence. Consequences can range from positive to negative" (see also, Hopkin, 2012). In other words, a risk is not always a threat to business functions; sometimes, it may bring great opportunities for them. A robust risk management programme is cable of minimising the likelihood of unexpected risks and losses through risk assessment and identification. Moreover, an effective risk management programme can determine threats and maximise opportunities which in turns help firms in achieving their strategic objective and increasing their shareholder's value. Given that ERM risk identification process considers both adverse outcomes and opportunities in a risk event, this study adopts IRM (2002) definition of risk.

2.2.2 The Difference between Risks and Uncertainty

Risks and uncertainty are two different concepts, although many people consider them to have the same meaning (Alvarez and Barney, 2005). The relationship between both words is similar to that between certainty and uncertainty. Given this vast difference between the two concepts in terms of their characteristics and their consequences, it is essential for the firms to distinguish between them accurately. Having a clear understanding of risk events and uncertain events enables the firms to respond more effectively (Prunea, 2003; Toma et al., 2012). While the traditional economics approach differentiates between risks and uncertainty, the latter is not standardised in practice. Uncertainty is sometimes considered an unknowable future event, whereas in some cases, it is perceived as knowable but not quantifiable. In contrast, risks are most often calculable and known probabilities (Motocu, 2009; Liesch et al., 2014).

Nistor (2005) postulates that risk originates from uncertainty. He argues that risk is linked to danger, and uncertainty can indicate either negative or positive probabilities. Therefore the risk is considered a negative component of uncertainty (Nistor, 2005). Hence the meaning of risk involves both uncertainty and some kind of losses, damage, or obstacle that might be received. The risk formula could be written as the following:

Risk = Uncertainty + Damage

Reducing uncertainty is highly recommended, mainly when it is associated with cost reduction (Toma, 2012). Hedging and insurance may help in reducing the remaining risks, and risk residuals should be assigned to stakeholders to endure them. In some case, uncertainty or risks can be reduced by conducting effective market research and by collecting information and presenting it to the decision-makers.

According to Hetland (2003) that the following statements explain uncertainty:

1. Risk is an outcome of an uncertain event/phenomenon.

2. The consequences of an uncertain phenomenon could be desired or not desired.

3. In order to manage uncertainty properly, uncertainty and its implications should be clearly understood.

Table 2.1 presents the definition of risk and uncertainty in the perspective of different authors:

Table 2. 1 Risk and Uncertainty

Authors and trends	Uncertainty	Risks
Entrepreneur Dual Trend	Objective stand – Ignorance for future	Subjective position An outcome of a decision maker's movement
Keynes JM	Impossible to measure in term of quantity	Possible to measure in term of quantity
Knight F.H	No probabilistic determination	Determined by probability
Neoclassical	Vague non-compensatory risks	Certainty Equivalent

Table 2.1 Risk and Uncertainty (Continued)

Authors and trends	Uncertainty	Risks
Neo Keynesian	Damage cannot be forecasted	Predictable losses
The sceptics	Indifference	Reticence
Subjectivists	Independently from decision-makers	Mainly belong to decision-makers
Roumassets	State of mind	Customise a given situation

Adopted from Toma et al. (2012); Source: (Duaran, 2007)

2.3 Risk Sources

There are several types of risks that organisations should take into consideration in their strategic planning and decision-making process. It is crucial for organisations to have a clear view and understanding of those risks, thus allowing the proper identification, analysis and response to be taken.

The three most common types of risks are strategic risks, operational risks and financial risks (see Hopkin, 2018).

Table 2. 2 Risk Typologies

Risk typology	Change and uncertainty in or due to
Political risks	Government policies, rules and legislations, views of general public, doctrine, troubles.
Planning	Government permission, policies and procedures, public opinion, land use policy, social impact.
Environmental	Pollution and land contamination, noise, legal permission, general public views, environmental laws and regulations.
Market risk	Demand and capacity, market peers, market trends, customer satisfaction.
Economic	Tax law, interest rate, inflation, currency risk.
Financial	Bankruptcy, high debt, increase cost, insurance, marginal trading risk.
Natural risk	Natural disasters, Earthquakes, volcanos, geological risks.

Table 2. 2 Risk Typologies (Continued)

Risk typology	Change and uncertainty in or due to
Project risks	Cost risk, schedule risks, performance risk (employee commitment and engagement, resources availability), leadership, organisation maturity and competences, strategic risks (planning and quality)
Technical	Design sufficiency, operational efficiency, accuracy.
Regulatory risks	Change in law or regulations by regulatory bodies.
Human	Errors, disengagement, tiredness, reliability, health and safety, culture, communication.
Criminal	Violence, robbery, sabotage, financial crimes.
Safety	Safety regulations, flooding, explosions, terrorism attack, fire.
Legal	Change in laws and regulation.

(Toma et al., 2012)

2.3.1 Operational Risks

Many scholars consider that most of the large scales financial failures that occurred in the past stemmed from operational risks (Hoffman, 2002; Alexander, 2003; Power, 2005; Moosa, 2007). According to the landmark work of Power (2005) the term "operations risk" has been introduced in the 1990s by the Committee of Sponsoring Organisations of the Treadway Commission (COSO). It first appeared in COSO integrated internal control framework. However, operations risks did not attract much attention until the Basel Committee introduced Basel II in 1999 (see Power, 2005; Weeserik and Spruit, 2018).

Basel committee defined operational risk as: "the risk of loss resulting from inadequate or failed internal processes, people and systems or external events. This definition includes legal risk but excludes strategic and reputation risk" (Bank of International Settlements, 2017;

Weeserik and Spruit, 2018). The committee suggests that companies can adjust the definition to their organisational context. An example of operational risks as classified by Basel II are Internal fraud; losses related to intentional or inappropriate acts; circumventing laws, regulations or organisation policy; external fraud; information breaches; damage to physical assets and natural disasters (Bank of International Settlements, 2017; Weeserik and Spruit, 2018).

2.3.2 Strategic Risks

The American Institute for Chartered Property and Casualty Underwriters (AICPCU) states that "strategic risk arises from trends in the economy and society including changes in the economic, political, and competitive environments, as well as from demographic shifts" (AICPCU, 2013). Louisot and Ketcham (2014) defined strategic risks as risks that affect the firm's ability to meet its strategic objectives, such as market risks, reputational risks and investment risks. Similarly, Andersen and Schroder (2010) outlined several types of strategic risks: market competitiveness, regulatory scrutinies, political events, consumer behaviour and the emergence of new technologies. Unlike these definitions, Kaplan and Mikes (2012) linked strategic risks with firm value, in which he argues that the main objective of firms' that take these types of risks is to increase their shareholders' value creation.

2.3.3 Financial Risks

In her pioneering work, Jiler (2000) defined financial risk as a likelihood of financial loss of a subject. For instance, a financial loss that a firm, recognised or did not recognise; or a future loss from derivatives and commodities. The most common interpretation of financial risks is the company inability to fulfil its debt obligation or bankruptcy (Moles, 1998). Maechler (2010) listed several sources of financial risks including, credit and liquidity risk, market position risk, and economic risks.

2.3.4 Energy Risks: The Case of OPEC

The Organisation of the Petroleum Exporting Countries (OPEC) was first established in 1960 in a conference in Baghdad by four Middle Eastern countries (Iran, Iraq, Kuwait, Saudi Arabia) and one South American Country (Venezuela). Nine other members, including African countries, joined OPEC a few years later (Qatar, Indonesia, Libya, UAE, Algeria, Nigeria, Ecuador, Gabon and Angola). These countries that belong to OPEC hold about 65% of the world's oil reserves (Al Thani et al., 2011; OPEC, 2019). According to International Energy Agency IEA, in 2018, OPEC accounted for approximately 40 million barrels of oil production a day, compared with 24 million barrels by organisations for Economic Co-operation and Development (OECD) members and 29 mbd by the Non-OPEC/Non-OECD countries. One of the main objectives of OPEC is to coordinate and integrate the petroleum policies of member countries and ensure the stabilisation of oil prices by balancing supply and demand (IEA, 2018; OPEC, 2019; OPEC Energy Review, 2019; Olayungbo, 2019).

Nevertheless, they achieved mixed success, especially in controlling oil prices. For instance, In 1973 OPEC created a shock in the global economy by announcing a 70% increase in crude oil prices and by cutting oil production, leading to fuel shortages and high inflation in different regions all over the world (Alhajji, A.F, 2005; Federal Reserve Bank of Boston, 2013; Merrill and Karen, 2007; Bini et al., 2013). This example is a clear evidence of the extent of oil prices risk and its vulnerability when assessing the economic feasibility of investment.

Similarly, during the 1980s, OPEC tried to adjust the production quotas by lowering them as an initiative to create stability in oil prices (Mahadeva and Fattouh, 2013). However, their attempts failed repeatedly, as many OPEC members produced beyond their quotas (Al Thani et al., 2008). During this period, Saudi Arabia has worked as an alternative producer to reduce its production to stop the decline in free prices. Later in 1985, Saudi Arabia changed their plan

(Al-Yousef, 1998), and they linked their prices to the Oil Spot Market, and they increased their production from 2 MMBPD to 5 MMBPD. Crude oil prices dropped below $10 per barrel by mid-1986 (Al Thani et al., 2011).

In 1997, OPEC increased its oil production by 10% without taking into consideration the Asian financial crisis. Consequently, prices plummeted again by 40%, to $10 per barrel. As a result, OPEC reacted by cutting production for six months with a plan to bring it up by the beginning of 2002 (OPEC Annual Report, 2001). The rise in oil demand in various counties all over the globe, especially the biggest countries in term of commodities demand, such as the US, China and India, increased the price by more than $50 per barrel. It peaked at $70 in April 2006 (Fattouh, 2010). In 2018 the prices reached $93 per barrel (Brent Crude), as a cause of the economic and political situation in the Middle East, as well as the uncertainty in other oil-producing countries. Even though hedging risk through derivative such as buying forward contracts could be a safe option when being exposed to this type of risk, yet the extent of oil price vulnerability makes this method very risky.

2.4 Risk Management Birth and Evolution

Back in the Babylon Empire times, the first disasters insurance had been established in the Hammurabi Code. The policy was created to cover the loss of fright due to shipwreck, where ships owners were able to take a loan to finance their cargo. However, it was not obligatory to pay the loan in case the ship is destroyed (see, Sadgrove, 2016).

The insurance companies, as we know them today, emerged in the 18th century. The first insurance company in the US is the Philadelphia Contributor ship, which was created in 1752 by Benjamin Franklin. The company was specialised in homes fire insurance, and it is considered today the nation's oldest insurance provider still in operation. (Insurance Handbook, 2010) (The Philadelphia contributorship, 2018). In London, Edward Lloyd first founded the

Society of Lloyd's at his coffee house in Tower Street. The firm was commonplace for sailors, merchants and ship owners, which became later a popular place for obtaining marine insurance. Later in 1771, several English businesspeople decided to unify their resources, and they officially established the Society of Lloyd's as a marine insurance firm (Putlitz, 2019).

Until the rise of risk management in 1970, business risks were not getting enough attention, and their consequences were either neglected or concealed. However, after the development of risk management, a large number of firms begun treating risks as a critical business concern (Dionne, 2013; Billings, 2017). In the late 1970s, risk management witnessed an incredible advent, and many scholars started publishing papers on the subject (Mandelker, 1974; Merton, 1974; Westerfield, 1977).

In the early 1980s, risk management was commonly recognised as a major topic in business and finance literature (Dionne, 2013). The risk management process, such as risk identification, risk estimation, and risk response, were examined by several scholars (Lifson and Shaifer, 1982; Chapman, 1998). Nevertheless, discussion in the risk management literature was mainly focused on quantitative analysis, and some of it referred to the PERT (Program Evaluation and Review Technique) type of triple estimates. Risk management was mainly focused on time management, estimated cost objectives, and project feasibility. The risk assessment process had been applied using software that conducts probability distribution for cost analysis. Risk management was very significant in large plant projects, especially in the energy and resources industry. Thus, BP and Norwegian Petroleum Consultants were the first who embraced the use of project risk management methods in the 1980s. Both firms established unique project risk management methods in the development and implementation of risk management methodology and in their risk analysis mechanism (Jaki and Rojek, 2016; BP, 2018). For instance, BP created a risk management software for internal use, named CATRAP, which

stands for (Cost Analysis and Timer risk Analysis Program) (Jaki and Rojek, 2016). The programme enabled the firms to carry out risk modelling of subjective probability distributions, and it was used in the North Sea Oil Drill Platform. In the same vein, the Norwegian Petroleum Consultants developed similar software for risk quantification and modelling (NPC) using a subjective probability distribution. The software was capable of calculating objective distributions from time data and cost with the capacity to integrate subjective and objective probability distributions. Further, NPC was able to combine time risk and cost in its modelling (Dover group plc, 2015; NPC, 2015). Other risk management software like CASPAR had also been developed in the late 1980s to provide risk assessment and analysis outputs for corporate organisations and projects in various types (Jia and Jobbling, 1998).

The use of derivatives started to appear in the late 1970s, where firms stated to use derivatives as an instrument to manage insurable and uninsurable risk, and it witnessed a noticeable development at the beginning of the 1980s (Kummer and Pauletto, 2012; Dionne, 2013). In addition, financial risk management became compatible with pure risk management in various firms. Financial firms, such as banks and insurance companies, started using credit risk management; however, both operational risk management and liquidity risk management emerged in the 1990s. The International regulations of risk also started in the 1990s. Financial firms started to be more concerned about unanticipated risk and on reducing regulatory capital, and they created risk management models and capital calculation formulas in order to protect themselves. Furthermore, governance of risk management became highly fundamental, and holistic risk management started to rise (see Miller, 1992; Stulz, 1996; Tufano, 1996).

In 2002, the Sarbanes Oxley regulation was developed in the US, after several financial misconduct, and bankruptcies, resulting from inadequate risk management practices. The Sarbanes Oxley regulation was introduced to set up governance rules and compliance for

organisations. Similarly, Stock Exchanges, including the New York Stock Exchange, announced new risk management and corporate governance regulations for listed companies (see Hege, Hutson and Laing, 2019). Notwithstanding, with all the risk management models, policies and regulations, the financial crisis came in 2007 and led to the collapse of many companies, including leading financial institutions and other large firms. The consequences of the 2008 financial crisis exposed the incompetency of traditional risk management programme (TRM) and the inefficiency in its implementation and execution. According to (Aabo et al., 2005) TRM manages risks in silos in which it divides the organisation risks into different categories that do not interact. Further, it mainly concentrates on pure risks, such as disasters and hazards (Dionne, 2013; Ogutu et al., 2018). In other words, silos risk management is only capable of supporting companies in avoiding risks that could cause direct loses in their assets, and it cannot mitigate risks or transform them into business opportunities (Miller,1998). Therefore, one of the main objectives of this study is to underline the importance of adopting Enterprise Risk Management (ERM) which is defined as '' an integrated risk management approach that treats the enterprise risks comprehensively and coherently, instead of managing them in silos'' (Dickinson, 2001). Table 2.3 includes some risk management definitions.

Table 2. 3 Definitions of Risk Management

Organisation	Definition of Risk management
IRM (2014)	It is a process that supports the enterprise in realising and evaluating its risk. It is also responsible for taking actions on all risks by increasing the likelihood of success and reducing the probability of failure.
Hopkin (2012)	It is a set of activities in an organisation that is undertaken to manage the delivery of the most favourable result. Also, it concentrates on decreasing results fluctuation and general volatility.

Table 2. 3 Definitions of Risk Management (Continued)

Organisation	Definition of Risk management
ISO31000 (2009)	Harmonious activities oriented to identify and control the organisation risks.
HM Treasury (2004)	Risk management is the process of identifying, assessing, and monitoring risks. It also undertakes actions, such as risk control and mitigation, as well as monitoring and process modification.
Meulbroek (2002)	Risk management is a process of managing and mitigating risks in order to increase shareholders value.
Handy (1999)	Risk management is not an unconnected or separate activity from management. The act of prediction and planning is considered prevention, where the reaction is a side effect of weak and incapable management.
Merna and Smith (1996)	Risk management is a set of activities undertaken by individuals or organisations to change and modify their business risk exposure.

Source: (Adapted from Paul Hopkin, 2012)

2.5 Traditional Risk Management and Hedging Activities

Studies in the field of risk management define traditional risk management (TRM) as a reactive model that can be identified as an administrative process decision-making process or managerial process. Considering risk management as a management process, it includes the four following functions: planning, organising, leading and controlling. The four management process functions help in reducing the organisation risk exposure and in minimising the effects of business accidents and losses at a reasonable cost (Head, 1973).

As shown in Figure 2.1, TRM consists of four main components: risk identification, risk analysis, risk control, risk financing, and risk administration. Risk identification is mainly focused on identifying operational risks, property risks and liability risks. Risk assessments examine the risk identification data, such as questionnaires, investigation reports and checklists

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to extract further information (Pagura, 2016, Ogutu et al., 2018). Risk analysis is used to investigate potential losses, while risks alternatives are then examined in risk control. Risk control works on risks severity assessment and preventive actions for reducing their negative consequences. The preventive actions are risk avoidance, risk prevention, risk reduction, risk segregation as well as combination and redesign processes. Minor and insignificant risks are usually tackled using corporate insurance, loss investigation and other types of support. The last TRM component is risk administration. This components managers risks activities using several tools such as risk information systems, safety recording, incident reports, and evaluating risk assessment information. TRM combines these five components for risk mitigation and effective planning (see Ogutu et al., 2018)
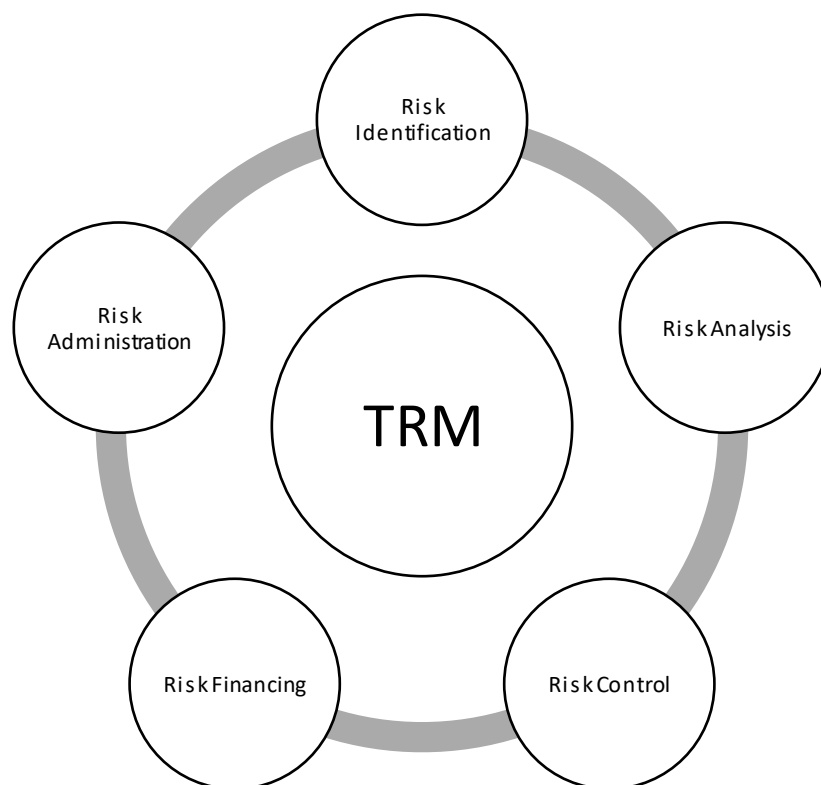
Figure 2. 1 Traditional Risk Management Components

Sources: (Ogutu et al., 2018)

According to Lundqvist (2015, p 2), "A traditional risk management process entails individually or in a silo identifying risk, measuring risk, monitoring, and perhaps reporting on risk but with little formality, structure, or centralisation; simple examples being an isolated group of individuals in the finance department hedging currency risk or a factory floor manager tracking incidents of injury on the job."

The existing body of literature on traditional risk management and hedging activities exposed the crucial relationship between companies' convex tax and earning. According to (Smith and Stulz, 1985) hedging can help in controlling earning fluctuations of the firm, which in turns minimises prospected taxes. Similarly, a considerable number of scholars stated that using hedging via derivative (options, swaps, forward and futures) is considered one of the most common strategies used for controlling earning volatility proportionately with the company tax (see Kummer and Pauletto, 2012; Dionne, 2013). In addition, there is a growing body of evidence that suggests that hedging have a positive influence on firm value. For instance, Gilje and Taillard (2017) conducted a study to examine whether hedging activities are associated with an increase in firm value. Using a sample of 150 Canadian and 119 US oil and gas producers, they found strong evidence that hedging activities have a positive influence on firm value. Also, they found that hedging reduces the likelihood of financial distress and underinvestment. Another study on the effect of different categories of derivatives usage on firm value was conducted by Lu (2018), who focused on non-financial firms in seven different countries. Interestingly, she found that interest derivatives decrease firm value worldwide, while currency derivatives have a significant and positive relationship with firm value except in the US and Germany. Further, she found that commodity derivatives support firm value only in German and Australian firms.

One well-known study that is often cited in research on TRM is that of Tufano et al. (1996). In his seminal work, he concluded that there is a negative relationship between hedging activities and firm value in a sample of North American gold mining firms. However, he found a significant association between hedging activities and ownership structure (managerial risk aversion), where managers who own stocks more than stocks options have more inclination for hedging practices. These results are congruent with those of Jin and Jorion (2006), who found that hedging activities do not influence firm value-maximisation. Another landmark study in the same area had been conducted by Petersen and Thiagarajan (2000), who made a comparison on the risk management strategy of two of the largest mining companies in the US. The mining firms are Barrick Gold America and Homestake Mining, which has been sold and merged with Barrick gold later in 2001. While Barrick gold was found to hedge their risks aggressively, Home Stake did not use any hedging. Petersen and Thiagarajan (2000) found that a firm risk management strategy does not have to rely on hedging activities to mitigate or avoid risks by discussing the case of Homestake, who successfully managed their gold prices fluctuation risk through the integration of the operation and accounting departments. Besides, they found that both companies have the same equity exposure to the price of gold.

More recently, literature has emerged that offers contradictory findings of the effect of TRM activities on firm value. In 2014, Ahmed, Azevedo and Guney, examined the effect of hedging activities on the firm value and firm performance of 288 non-financial firms listed in the London Stock Exchange (LSE). Their study found a negative relationship between interest rate hedging and firm performance; however, they found that future contract positively impacts firm performance. Inconsistent with many previous studies, they found that all types of hedging are not associate with an increase in firm value (Ahmed, Azevedo and Guney, 2014).

Similar to (Ahmed et al., 2014), building on the work of Froot, Scharfstein, and Stein (1993), Altuntas et al. (2017) studied the relationship between hedging, cash flow and firm value on a sample of life insurance publicly listed companies. They found that both hedging and cash flow volatility has a significant negative relationship with firm value. However, consistent with Smith and Stulz (1985), Kummer and Pauletto (2012), Dionne (2013), they found that hedging activities reduce the severity of cash flow volatility.

Due to the inefficiency of TRM in supporting firm performance, especially during a crisis, ERM advocated as a solution to this problem. The following section will outline the main differences between ERM and TRM.

2.6 Differences between ERM and TRM

Back in the 70s, risk management was only focused on pure risks (hazards and natural disasters). The changes in the global business environment in the 80s put the companies under higher exposure to new different types of risks such as "market risk". Later in the 1990s, TRM expanded its coverage into other different risk types (Simona-Iulia, 2014). Even after the expansion of the traditional risk management components in the 1990s, it was still incapable of covering various risks and uncertainties. Alternatively, Enterprise Risk Management emerged with a new vision and a new paradigm to solve this problem (Selim and McNamee, 1999; Barton et al., 2002; Beasley et al., 2005; Silvestri et al., 2011). Unlike the traditional decentralised approach, which applies an ad hoc process in managing risks, ERM programme manages the organisation risks comprehensively (see Schroeder and Jackson, 2007; Simona-Iulia, 2014; McShane, 2018; Ogutu et al., 2018; Renzi and Vagnani, 2020). TRM approach creates inefficiencies due to poor coordination between different risk managers and departments (Pagach and Warr, 2010). Besides, it addresses only pure risks. ERM interdependently address various risk types (strategic risk, operational risks, market,

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reputational risk, and credit risk) (see Ogutu et al., 2018; McShane, 2018; Renzi and Vagnani, 2020).

Moreover, ERM supports the organisations' strategic plans, and it attempts to transform risks into profitable opportunities. Conversely, the traditional risk management approach is only focused on threats and risk mitigation. It is incapable of turning risks into opportunities (Lundqvist, 2014). Ogutu et al. (2018, p 47) concluded that "from a traditional risk perspective, it is essential to maximise resources to eliminate risk. From an enterprise risk perspective, looking for the right combination of risk for profitability is key". Many managers with TRM attitude tend to hedge any risk without considering its possible opportunity. Among the historiography of ERM, perhaps the most well-known work is that of René M. Stulz (1996) where he argues that many strategic level management prefers practising traditional risk management strategies such as hedging activities due to their managerial compensation contracts. Thus the firm tends to hedge substantially. If management owns a considerable number of shares, their compensation is significantly affected by the fluctuation of the share price (see also Tufano, 1996).

The literature on risk management has pointed out many other weaknesses and inefficiencies in the TRM approach. One of its main limitations is that it only focuses on transferable risks, such as financial and accidental risks. However, ERM targets risks in a broader dimension, such as applicable operational and strategic risks (Rodriguez and Edwards, 2009). Banham (2003) postulated that TRM requires accounting skills, whereas ERM needs strategic analysis, strategic planning, innovation, and marketing expertise.

In 2007 AP-Networks conducted a survey study examining the main reason of traditional risk management failure in the oil and gas sector. The survey concluded that traditional risk management fails in the oil and gas sector, due to its insufficiency in managing several risk

categories that are causing severe negative impacts on the projects. The study also proposed using ERM techniques as a solution, such as establishing common risk categories and holding cross-functional risk identification procedures (Schroeder and Jackson, 2007). Consistent with AP-Networks survey, numerous researchers, suggested that ERM integrative approach is more effective compared to the silos risk management approach. The next section summarises ERM in the academic finance/risk management and insurance literature and practice. Table 2.4 provides a summary of the literature about the difference between TRM and ERM.

Table 2. 4 Difference between TRM and ERM

Traditional Risk Management (TRM)	Enterprise Risk Management (ERM)
View: Silos risk management addresses risks Independently. No comprehensive understanding of interdependencies and integration of risks portfolios.	View: ERM deals with risks holistically as an entire risk portfolio. Interactions among risks analysed and acknowledged. Natural hedges are identified and utilised efficiently. Recognises internal/external contexts in examining risk portfolio.
See, Harrington et al. (2002); Power (2005); Ai et al. (2012); and Lundqvist (2014); Silva et al (2019)	
Reduced strategic scope or impact. TRM is technical, not strategic. Risk management is not an essential factor in decision making by the board and senior management and not perceived as necessary by corporate governance. Operation management practices.	ERM takes the firm risk appetite into consideration in examining strategic options for achieving strategic objectives. The CEO and the board are responsible for ERM, which is considered very important by corporate governance. ERM plays an essential role in decision making.
See, Turnbull (1999); McRae and Balthazor (2000); COSO (2004); Sobel and Reding (2004); Mikes (2005); Stroh (2005); Arena et al. (2010); Beasley and Frigo (2010); Branson (2010); Andersen and Schrøder (2010); Purdy (2011); Ai et al. (2012); Lundqvist (2014 and 2015); and Marks (2015).	
TRM is not taken into consideration for the allocation of capital.	Economic capital view: assigning capital to attain the maximum risk-adjusted return.
See Stulz (1996); IFAC (1999); Garside and Nakada (2000); Miccolis (2002); Power (2005); Sobel and Reding (2004); Mikes (2005); Nocco and Stulz (2006); Toneguzzo (2010); and Ai et al. (2012).	
TRM has a negative, cost-based, and narrow view of risks. Besides, it is focused only on the disadvantages of risks.	ERM has a positive, value-based, broadly focused view of risks. It considers both the downsides, risks and opportunities. Further, It can exploit opportunities to add value.
See, Stulz (1996); IFAC (1999); Barton et al. (2002), and Plessis et al. (2015).	

Table 2. 4 Difference between TRM and ERM (Continued)

Traditional Risk Management (TRM)	Enterprise Risk Management (ERM)
Unclear risks ownership of risks types.	All the organisation's risks appointed ownership with accountability.
see Power (2004); Nocco and Stulz (2006); and Power (2009).	
TRM concentrates only on quantifiable risks, for instance, disasters and financial risks, while other risks such as supply chain, cyber risks, and reputation risks may be concealed or neglected.	ERM uses a holistic risk oversight framework and risk culture for addressing several types of risk. Uniquely determines and emphasis top/critical risks and understanding their primary causes.
See, Barton et al. (2002); Harrington et al. (2002); Mikes (2005); Stroh (2005); Gates (2006); Ai et al. (2012); and Fraser and Simkins (2016)	

(Sources: Adopted from McShane, 2018)

2.7 ERM Evolution, Definitions and Frameworks

In 2004, ERM had been listed as one of the breakthrough ideas of Harvard business review (Buchanan, 2004). Several consultancy firms, regulatory bodies, stock exchanges, and professional associations have stressed on the significance of implementing an ERM programme and linking it with their organisation's strategies (Arena et al., 2010). The first of many investigators who demonstrated the importance of developing an Enterprise Risk Management is Kloman (1992). In his research, he stated that many practitioners supported and endorsed the integrated risk management approach. He refers to an announcement of Chief Analyst Gustav Hamilton from Sweden, who noted that there is a vital need for a new and collective risk management system (Kloman, 1992). Similarly, Orio Giarini, the current director of risk in Geneva, also suggested that risk management should reinforce strategic capability. Back in 1980, Before Kloman and Orio raised the importance of implementing a new risk management system, Crockford (1980) called for a multidisciplinary risk management approach rather than a fragmented system that manages risk in silos. Bannister and Bawcutt (1981) supported Crockford statement, in which they claimed that risk managements requires various disciplines working together to manage any unexpected future risk. Haimes (1992),

called for a holistic approach which he titled "total risk management". Haimes suggested a system engineering process with risk management as a fundamental part of "the overall managerial decision-making process, not a separate, vacuous act" (Haimes, 1992, p 315). He urged for a move from single-objective decision making to multiple-criteria decision making to support in attaining integrated and cross-disciplinary risk management. Haimes suggested that risk management decisions should impact the "optimal allocation of the organisation's resources" (see also Bromiley et al., 2014).

Table 2. 5 Definitions of ERM

Holton (1996)	ERM is about developing and advancing the process where high risk is being taken.
Banham (1999)	ERM main objective is to identify, analyse, and quantify all the company internal and external risk that are stemming from the operation, strategic, or financial activities of the firm.
Deloach and Temple (2000)	Enterprise Risk management is a holistic approach that combines all the company risks (financial and non-financial) in one integrated system. ERM main goal is to create value for the company shareholders through the alignment of the organisation strategy, operation process, human resources, and technology.
Miccolis (2000)	ERM is an integrative approach that mainly focuses on managing all the company risks holistically and rigorously in order to achieve a sustainable strategic objective.
Deragon (2000)	ERM is a holistic approach that works on managing interrelationships systematically, reducing inherent risk, and increasing harmony in the organisation operation process.
Perrin (2001)	ERM is an integrated risk management approach that assesses and manage the organisation risk comprehensively, which in turns reduce threats and increase frim opportunities.
Institute of Internal Auditors (IIA, 2001)	Enterprise Risk Management is a fundamental and rigorous approach to assessing and responding to any organisation risk exposure that mainly affects the company financial health negatively.
Casualty Actuary Society (CAS, 2003a)	ERM is a process by which organisation in all sectors, evaluate, monitor, identify, examine and mitigate all the risk that the organisation is exposed to, in order to maintain value creation for its stakeholders.

Table 2. 5 Definitions of ERM (Continued)

Committee of Sponsoring Organisations (COSO, 2004)	"ERM is a process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives."
S&P (2008)	Enterprise risk management approach is a systematic risk management program, capable of responding to any organisation risk exposure that may threaten its mangers, shareholders and stakeholders. ERM concentrate on "risk/reward" approach instead of the TRM "cost/benefit" approach, and it works on analysing risk intelligently by identifying risk opportunities and mitigating threats and dangerous risks, which in turn assure firm value creation.
ISO 31000 (2010)	"Risk management is coordinated activities to direct and control an organisation with regard to risk."
RIMS (2011)	ERM is a strategic business discipline that helps in achieving the organisation objectives by tackling the full series of its risks and managing the combined effects of those risks as an integrated and linked risk portfolio.

(Sources: Adapted from Bromiley et al., 2015)

While Colquitt et al. (1999) advocated for a new risk management approach and he used the term "integrated risk management", the first academic research where the term enterprise risk management was clearly stated is by Dickinson (2001). According to Dickinson (2001, p 360), ERM arose as a corporate concept in the 1990s, and he defined it as a "systematic and integrated approach of the management of the total risks a company faces."

There is no final agreement in the literature on the definition of ERM. Bromiley et al. (2015) provided a table of more than 20 ERM definitions from the literature. Table 2.5 outlines some of these definitions. One of the most cited ERM definitions is that of the Committee of Sponsoring Organisations of the Treadway Commission (COSO) that defines ERM as:

"…a process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that

may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives (see COSO 2004, p. 2)."

Similarly, Wu et al. (2011, p 1) defined ERM as "… the integrated process of identification, analysis and either acceptance or mitigation of uncertainty in investment decision making."

D'Arcy and Brogan (2001) defined ERM as, a process in which the organisation assess, control, exploit, finance and monitor risks in all industries, covering all the organisation sources to increase value creation for the organisation stakeholders on the short and long term [Casualty Actuarial Society (CAS), 2003].

Several forces contributed to a shift from the traditional risk management approach to Enterprise Risk Management. Corporate failures, which could be an impact of many forces, including poor risk management practices, are considered a significant reason for the emergence of ERM (Manab et al., 2010). While several companies and stock markets all over the globe, introduced new guidelines and new compliance requirements regarding risk management programs, many other external factors led to the evolution of Enterprise Risk Management, such as the development of new business models and new business practices (Tillinghast – Towers Perrin. 2000). ERM birth made an effective radical change in the companies risk management approach, in which it introduced a process where all risk categories, including strategic and social risks, can be proactively managed (DeLoach, 2000; Rao and Marie, 2007; Collier, 2009). It enables companies to deal with different types of risk exposure, such as political trends, market instability, technology risk, competition and new market entrants threats (DeLoach, 2000; Beasley et al., 2005; Manab et al., 2010). Further, ERM is capable of promoting organisations' ability in responding to both internal and external risks. In doing so, firms will be able to stabilise their earnings and increase their shareholder's value creation (Andersen, 2008).

Since ERM advocated as an alternative for traditional risk management, several international organisations started establishing specific frameworks for the standardisation of its implementations procedures. For instance, "Committee of Sponsoring Organisations of the Treadway Commission (COSO)" developed its "Enterprise Risk Management-Integrated Framework" and published it in 2004. Later, it was updated in 2011, 2012 and 2016. Similarly, "International Standards Organization (ISO)" released "ISO" in 2009 as a standard for risk management (Lundquist, 2013). In addition to the two popular ERM frameworks described above, there are many other frameworks such as "Standard and Poor's ERM framework" (S&P's, 2005), "Arthur Andersen Business Risk Management Process", "Casual Actuarial Society" (CAS, 2003), "Management of Risks (MoR)", "The Australian/New Zealand Risk Standard (AS/NZS 4360)", "South Africa King III", "The FERMA Risk Management Standards", "The Combined Code and Turnbull Guidance", "The Institute of Risk Management (IRM) Risk Management Process", and "The International Association of Insurance Supervisors Framework" (Bac, 2010; Bin Kasım & Hanafi, 2012; Maingot et al., 2012; Lundqvist, 2014; Wessells and Sadler, 2015; Annamalah et al., 2018; Eryilmaz, 2018). Although several international organisations attempted to standardise ERM implementation, yet a considerable number of studies concluded that there is no standard approach to its deployment (Agarwal and Ansell, 2016). Further ERM implementation approach differs between an organisation and another.

The next section provides a definition and a critical analysis of some of the most cited ERM frameworks in risk management and insurance literature.

2.8 Enterprise Risk Management Frameworks

In this section, each of the existing ERM frameworks will be examined:

1. COSO ERM framework 2004

2. COSO ERM framework 2017

3. ISO 31000: ERM framework

4. Standard and Poor's ERM evaluation framework

The current change in the global environment, the growing market competition and the increase in supply chain risks have led to the rise of ERM as a new integrated risk management approach. One of the main reason behind the rapid development of the holistic risk management approach is its ability to identify, analyse and respond to a broad portfolio of risks proactively. This enables ERM adopting firms to enhance their competitive advantage by maximising their risk-return trade-off (Nocco and Stulz, 2006; Farrel and Gallagher, 2015; Lechner and Gatzert, 2017). Furthermore, ERM addresses risks interdependently across the entire organisation, which enables firms to take into account both opportunities as well as threats and downside risks (see, Meulbroek, 2002; Nocco and Stulz, 2006; Rochette, 2009; Hoyt and Liebenberg, 2011; Tufano, 2011; Lechner and Gatzert, 2017). Despite these extensive benefits of ERM and its ability to create shareholders value (Hoyt and Liebenberg, 2011), only a few publicly listed companies clearly understood its integrated frameworks (see, COSO, 2010; Prudy, 2010; Agarwal and Ansell, 2016). This lack of understanding is hindering the programme implementation. Therefore, different bodies have proposed several risk management frameworks as an attempt to support and standardise the implementation of ERM. Some of the most renowned frameworks that had been established are Standard and Poor's ERM framework, the Turnbull Guidance, ISO 31000, CAS framework and COSO framework (Raz and Hillson, 2005; Frigo & Anderson, 2014; Ahmad et al., 2014; Agarwal & Ansell, 2016). Given that the COSO framework is broadly cited in the insurance and risk management

literature, it is therefore adopted by this study. COSO ERM framework has been developed by the Committee of Sponsoring Organisations of the Treadway Commission in 2004 (COSO, 2004) and updated in 2017 (COSO, 2017). COSO is a voluntary organisation that belongs to the private sector, led by IMA (Institute of Management Accountants), IIA (The Institute of Internal Auditors), Financial Executives International (FEI), the American Accounting Association (AAA), and the American Institute of Public Accountants (AIPA). Figure 2.2 shows the 2004 COSO framework, whereas Figure 2.3 and 2.4 show the COSO framework 2017.
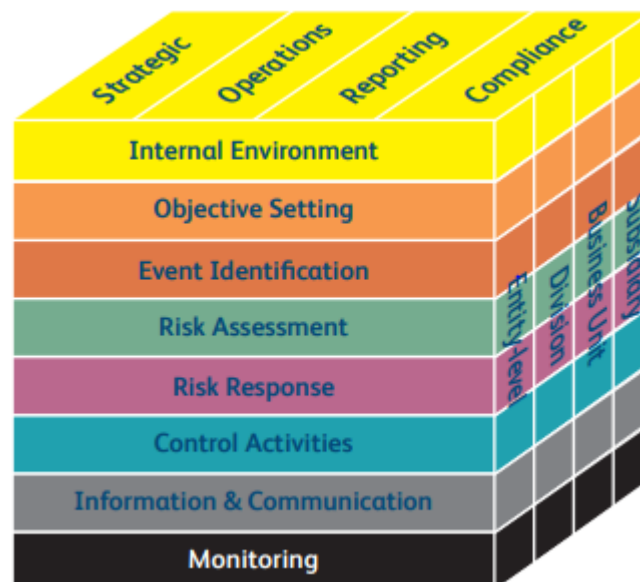
Figure 2. 2 COSO Framework (COSO, 2004)

2.8.1 COSO Enterprise Risk Management Framework 2004
COSO defined Enterprise Risk Management as:

"A process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risks to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives." (COSO, 2004, p 2).

As described in Table 2.6, the COSO framework is composed of eight components of ERM that are necessary to support a firm in achieving its aims and strategic objectives (COSO, 2004; Rubino, 2018). In order to deploy an accurate Enterprise Risk Management programme, it is crucial to effectively implement and integrate the eight components of the COSO framework. The framework provides entity-wide risk management across four risk objectives: strategic, operations, reporting, and compliance. According to the COSO framework, holistic risk management is achieved by examining risks at all levels of the organisations (subsidiary, business units, division, entity) (COSO, 2004). "In simple terms, in order to achieve a successful ERM initiative, an organisation needs to implement all eight components shown on the front of the cube in relation to each of the four risks indicated across the top in all parts of the organisations, as indicated on the side of the cube" (IRM, 2018, p 10).

Table 2. 6 Integrated Components of the COSO ERM Framework

Component	Description
Internal environment	The internal environment includes the tone of a firm and is considered the basis for how risk is perceived and tackled by their employees. The guidance also considers risk management philosophy and risk tolerance, integrity and ethical values, and the operating environment.
Objective settings	The board of directors should set the organisations objectives in line with its mission and following risk appetite. For establishing effective objectives, the organisations need to be aware of the expected risks in case different objectives are pursued.
Event Identification	Event identification mainly focuses on potential internal and external events that may affect the organisations' ability to achieve their objectives. These events could be either opportunities or negative threats. In case opportunities are identified, they will be redirected to the objectives setting process. However, events that are classified as negative threats are managed by ERM.
Risk assessment	To assess the probability, frequency and the consequence (e.g., financial, reputation) of risk events across a range (best to the worst case) of possible results related to the events.

Table 2. 6 Integrated Components of the COSO ERM Framework (Continued)

Component	Description
Risk response	Identifies, examine and selects risk reaction options that line up with the organisation's risk tolerance and risk appetite. For instance, risk avoidance practices such as not engaging in an activity, or decreasing the risk by reallocating resources; or by implementing a robust business process. Another risk response is risk sharing such as insurance, partnering, contractual agreements, hedging and acceptance.
Control activities	Ensuring that risk policies and procedures are in place and implemented efficiently and that the ERM initiatives are active. Control activities could be authorisations, physical security, segregation of duties, reconciliations and recognitions and reviews.
Information and Communication	Information communication is used to identify, capture and communicate relevant information/data in an accurate form and timely frame which enables stakeholder to perform their responsibilities.
Monitoring	Monitoring Enterprise Risk Management performance for continuous improvements and updates.

Source: (COSO Framework, 2004)

2.8.1.1 Internal Environment

The internal environment encompasses setting a suitable tone and risk culture for the organisations. It sets the foundations of how risks are seen and treated by the firms' people, including risk management philosophy and risk tolerance, integrity and ethical values, and the environment in which they operate (COSO, 2004).

The importance of Enterprise Risk Management should be communicated and supported throughout the organisational process. ERM should be embedded in the firm risk culture in which all the entity people should be aware of it. According to Deloach (2000) and Ryan (2008) communicating the risk strategy and structure are significant for the firm; thus the firm should provide ongoing ERM training programmes, and use an official standard language, in order ensure that the board objectives are clear and comprehensive for everyone (see IRM, 2018).

Appropriate risk appetite should be determined by the organisation management (Power, 2009). In other words, the amount of risk tolerance the organisations set out (Vagneur, 2004) as it works for achieving its objective and value creation (Institute of Internal Auditors, 2009). Those strategies reflect the entity risk philosophy that has a significant impact on its risk culture and ethical values.

2.8.1.2 Objective Setting

It is essential to set objectives before management identifies any uncertain events or vulnerability affecting their achievements. ERM assures that the firm has an objective setting process established efficiently and that the selected objectives support and align with the organisation mission and are steady with its risk tolerance (COSO,2004)

The objective setting also ensures setting risk strategies and firm objectives accordingly. By setting the risk strategy, the firm will be able to closely align its aims and strategic objectives with its risk appetite along with the goals of their ERM (Power, 2009). Creating a bespoke risk strategy is a very substantial activity for the firm, in which it impacts all of its future investment decisions. An efficient approach should reveal opportunity risks that could benefit the entire firm.

2.8.1.3 Event Identification

Event Identification encompasses identifying internal and external factors that influence the achievement of the firm strategic objectives. Also, it distinguishes between risks and opportunity. In case opportunities are identified, they are channelled back to the strategic management level or objective-setting (COSO, 2004).

Management creates a risk portfolio, which includes a detailed listing of all possible risks that may face the organisation; such a process will allow the firm to have a portfolio view of risks at the entity level. Many risk management scholars argue that risk identification should be

established as an ongoing process because risks are continuously emerging (Tillinghast – Towers Perrin, 2000; Loboda and Csiszar, 2007). Further, recording risky events and uncertain conditions is considered a critical practice that helps in updating the firm's risk portfolio and in differentiating downside risks from opportunities automatically (Tillinghast – Towers Perrin, 2000).

Several methods can be used to identify risks and build a risk portfolio, such as surveys, internal auditing, interviews, and brainstorming sessions. Knowing that each firm may have its different and unique characteristic (Golshan and Rasid, 2012; Bohnert et al., 2017), many ERM scholars concluded that risk identification should be carried out as a top-down directed process (Ed O'Donnell, 2005; COSO, 2009; Hoyte and Liebenberg, 2017; Bonhert, 2017). Ed O'Donnell (2005) claims that the top-down approach is a highly effective risk identification process, in which it starts from top risks (such as reputational risks) that mainly hinder the achievement of entity-level objectives. Risk Identification at the strategic management level can be conducted by establishing workshops with the board, and senior executives, in addition to interviews with senior management to support the process. Next, a bottom-up approach could be launched that aims to identify risks at the operational level, which is usually owned by the employees (Hung et al., 2008). This hybrid form of the top-down and bottom-up approach is capable of identifying risks at an entity- and process level.

2.8.1.4 Risk Assessment

In risk assessment, the organisations' risks are analysed, and the risks probabilities and their expected effect on the firms are investigated. The risk assessment helps in determining the best strategy for managing severe risks (COSO, 2004; Caldwell, 2008). Also, this stage helps senior management to develop a clearer understanding of the impact of potential events on the firm objectives that were set-out in the objective setting stage (AIRMIC, 2010). Further, risks are

analysed in terms of their impact and probabilities on both an inherent and residual basis. In doing so, several analysis and techniques can be used, such as sensitivity analysis, scenario analysis and stress testing (Uwizeye, 2013).

2.8.1.5 Risk Response

In this step, the management of the firms determines the most effective response to address their risk. There are various options of risk responding activities such as risk avoidance, risk acceptance, risk mitigation or risk-sharing. In addition, it also focuses on developing a set of actions to align risks with the firms' risk tolerances (Caldwell, 2008). After obtaining a sum of all risks from various categories, the management team examines the entire risk portfolio and respond accordingly. The theory of risk portfolio considers that different risks have identical characteristics. Risks are classified and viewed in different categories based on the correlation between them. Understanding this association will help in revealing the state of the firm. This portfolio view of risks supports executive managers to make effective risk responses based on a complete view of the firm.

2.8.1.6 Control Activities

Control activities are applied all over the organisation, including all its levels (Operation level, Technical level, and strategic level). Policies and procedures are created and implemented to ensure that risk responses are executed efficiently (COSO, 2014)

2.8.1.7 Information and Communication

Information is essential for organisations to allocate internal control responsibilities and to support the achievement of their objectives. Thus, the management team gathers information from both internal and external sources to support the internal control process. Communication is an ongoing and repeated process of supplying, sharing, and getting relevant information (COSO, 2004). The Internal communication process encompasses distributing information all over the organisations, from top to bottom and across the firm (COSO, 2004; IRM, 2018). It

allows the employees to obtain a clear message from the senior management that the control activities should be rigorously applied. In the other hand, external inbound communication enables communication of applicable external information and produces information for the external parties and stakeholders according to their need and expectations (Deloitte, 2015).

2.8.1.8 Monitoring

Monitoring activities is a continuous joint evaluation, isolated evaluations, or some combination of the two, applied to confirm if each of the five components of internal control, including controls that influence the principles within each component, is available and operating efficiently (Deloitte, 2015). Continuous evaluations, integrated with the business process at various firm-levels, provides timely information (Uwadiae, 2015). Evaluation in isolation which is applied periodically will differ in scope and varies based on risk assessment, effectiveness of continuous evaluations, and other management considerations. Outcomes are evaluated against criteria created by regulators, standardisation bodies, or senior executives and the board. Any defects are usually reported to management and the board of directors (COSO, 2004; Deloitte, 2015).

2.8.2 COSO Framework 2017

Figure 2. 3 COSO 2017 framework 2017 (COSO, 2017)

In 2017, COSO published an updated version of their 2004 ERM framework (see COSO, 2017). The publication is entitled "ERM – Integrating Strategy and Performance". The primary

purpose of publishing this guidance is to connect ERM with a large number of stakeholders expectations explicitly; to link risk with the organisation performance, instead of positioning it as a private practice; to allow firms forecast risks more effectively, not merely the likelihood of crisis; and to establish a clear understanding that helps in creating opportunities (IRM, 2018). One of the main fundamentals of the 2017 COSO framework is that ERM should be implanted into the organisation practices, including the mission, vision and core values. For instance, when setting business strategy and the key performance objectives, the firms should take into consideration the effects of the chosen strategy. Also, the firms should consider the risks to strategy and performance as well as the likelihood that the strategy could skew from the core values (See, COSO, 2017; Pierce et al., 2017; IRM, 2018)

The 2017 COSO framework distinguishes between ERM and internal control and improves the understanding of risk appetite and risk tolerance. The purpose of the framework is to increase the importance of strategy, refine the alignment between performances and engage ERM in the decision-making process. In addition, COSO 2017 ERM framework focuses more on the association between risk and firm value as well as the advantage of ERM integration compared to its older version. Furthermore, the framework emphasises on the essential role of the organisation culture for successfully implement ERM. COSO considers that in the long term, the implementation of ERM can support the organisations by increasing their resilience and their ability to foresee and respond to risks.

Figure 2.3 presents COSO guidance and its five components. The principles supporting each of these components are shown in figure 2.4. The full implementation of these principles indicates the ERM is mature and capable of increasing firm value (COSO, 2017; IRM, 2018).

Figure 2. 4 COSO 2017 framework- ERM principles and components (COSO, 2017)

2.8.2.1 The Components of COSO Framework 2017

1. Governance and Culture: Similar to COSO 2004 Internal environment (COSO, 2004), governance establishes the firms' tone. It induces the importance of ERM and assigns its oversight responsibility for the management. Culture is related to the ethical values, required behaviours, and establishing a clear understanding of risks in the entity (COSO, 2017; Pierce et al., 2017; IRM, 2018).

2. Strategy and Objective-Setting: In COSO 2017 guidance, the organisations' strategic planning combines ERM, strategy, and objective setting in the process. Risk appetite is developed and lined-up with strategy; the strategy is implemented by the business objectives that also involves in the risk management activities such as risk identification, risk assessment, and risk responding (COSO, 2017, IRM, 2018).

3. Performance: In the performance component, any risks that may influence the firm strategy execution or its firm performance is identified and assessed. Next, the risks are priorities based on their severity and in line with the firm risk appetite. The firm then chooses the most effective response and re-consider the entire risk portfolio and the number of risks they anticipated. The outcomes of this process are communicated to the key stakeholders of the firm (COSO, 2017).

4. Review and Revision: After examining the organisation's' performance, a firm can determine how well the ERM components are operating taking into consideration any business changes, and the types of revisions required (COSO, 2017).

5. Information, Communication, and Reporting: ERM needs an ongoing process of collecting and communicating relevant information from internal and external sources, which flows all over the organisations (COSO, 2017; IRM, 2018).

2.8.3 ISO 31000: The International Risk Management Standard

ISO 31000 was published in 2009 (ISO31000, 2009) as the standards and guidance on the implementation of ERM by the International Organization for Standardisation, which was revised from the Australia/New Zealand risk management standard (AS/NZS 4360).ISO framework achieved high popularity in Australia; however, it was not implemented extensively in the UK and the US (Everett, 2011). The primary purpose of ISO 31000 is to:

"helps organisations develop a risk management strategy to effectively identify and mitigate risks, thereby enhancing the likelihood of achieving their objectives and increasing the protection of their assets. Its overarching goal is to develop a risk management culture where employees and stakeholders are aware of the importance of monitoring and managing risk" (ISO 31000, 2018, p 2).

Unlike other risk management frameworks, ISO 31000 uses the traditional term "risk management" in its standards and guidelines. It defines risk management as *"coordinated activities to direct and control an organisation with regard to risk"* (ISO31000, 2009, p 2). It also explains the risk management framework as a *"set of components that provide the foundations and organisational arrangements for designing, implementing, and monitor, reviewing and continually improving risk management throughout the organisation"* (ISO31000, 2009, p 2). Risk Identification is considered one of the main strength of the ISO

31000 risk management approach, as it identifies risk owners, which is fundamental for allocating responsibilities, communication and risk management training. ISO risk management framework is built in a form where it is connected to firms' objectives at all levels, from top management to middle and operations level (Gjerdrum et al., 2011). Many scholars claimed that there is a high degree of commonality between ISO 31000 and the COSO framework. Hence they stated that manager who already fully implemented the COSO framework can still switch to ISO 31000 without doing a radical change.

Others also claim that the aim of ISO 31000 is to establish the principles and guidelines on risk management for any organisation (Public, private, or individual). In a comparison between ISO31000 and COSO framework, Gjerdrum and Peter (2011) argue that COSO ERM Framework is a complex, multi-layered and complicated directive, where many firms have found it very hard to establish. On the other hand, ISO is created with more streamlined procedures that are less complicated to implement. Gjerdrum and Peter (2011) claim that ISO is constructed on a management process, and by tailoring the process for each firm, it amalgamates into the current management and strategic objectives. However, the COSO framework is based on control and compliance, which makes it hard to be adopted by traditional risk managers. If an enterprise internal audit team executed COSO, there is the obstacle of having the programme audited by the same managers who enacted it.

In contrast, Mike and Kaplan (2013) argue that the implementation of ISO 31000 could be problematic because its guidelines are very broad and general. Further, it is designed to apply to all the organisational levels and to manage any risks. These characteristics make the framework implementation very complicated. Leitch (2010) agrees with Mike and Kaplan in which he stated that many of the definitions in ISO 31000 are not clear, and he suggests re-

considering the actual usage of the terms. For instance, ISO 31000 defines risk as "the effect of uncertainty on objectives".
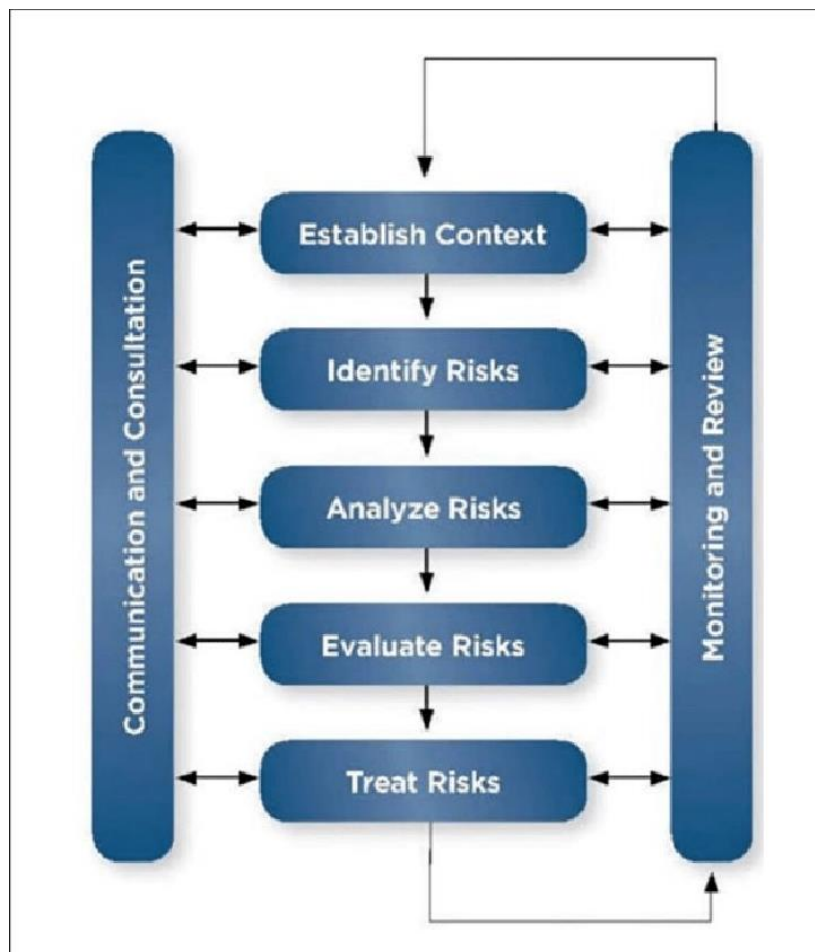
Figure 2. 5 ISO 31000 ERM framework (ISO, 2009)

In contrast, Mike and Kaplan (2013) argue that the implementation of ISO 31000 could be problematic because its guidelines are very broad and general. Further, it is designed to apply to all the organisational levels and to manage any risks. These characteristics make the framework implementation very complicated. Leitch (2010) agrees with Mike and Kaplan in which he stated that many of the definitions in ISO 31000 are not clear, and he suggests re-considering the actual usage of the terms. For instance, ISO 31000 defines risk as *"the effect of uncertainty on objectives"*. The definition can be interpreted in various ways, which may be far from the exact meaning of risk. Therefore, ISO 31000 lacks clarity and could lead to an

inefficient decision if implemented. Also, it is considered to have a weak mathematical basis, as it has little to say about probability, data and models (Aven, 2012).

2.8.4 Standard and Poor's ERM Rating

According to the latest publication of Standard and Poor's (S&P, 2008), any company that implements a popular and accepted risk management framework, such as COSO, will be recognised. Standard and Poor's will not consider having a recognised risk management framework in place as evidence of a successful risk management system or evidence of a robust ERM. S&P's rating will mainly concentrate on the companies risk culture and strategic risk management, and these criteria are applicable worldwide to-rated firms (NCSU, 2008; S&P's, 2008; S&P, 2015).

S&P's consider that having a robust ERM programme in place indicates that the firm is covering all risks, has a specified risk appetite, and has implemented a risk strategy to avoid or mitigate risks outside its risk tolerance (S&P's, 2008). The senior management and the board of the organisation should take full ownership and responsibility of the ERM programme. An organisation that has an ERM programme should change its risk philosophy from a cost/benefit approach toward a risk/reward approach and understand that risks could present profitable opportunities. Further, S&P's does not perceive ERM as an alternative for internal control or a method to abolish risks for all companies in all industries.

Since 2005, ERM components have been included in S& P's credit rating, which has been mainly focused on the energy, insurance and financial services sectors (S&P's, 2005; Desender and Lafuente, 2009). While risks and uncertain events have been an ongoing threat for firms in different sectors, Standard and Poor's designed an ERM rating methodology in 2008 for non-financial firms as part of their credit rating analysis (S&P's, 2008; Juthamon, 2016). Figure 2.6 presents S&P's ERM evaluation framework.

Figure 2. 6 S&P's ERM evaluation framework (S&P's, 2015)

In order to meet S&P's rating criteria, firms that belong to both financial and non-financial sectors should concentrate their risk management strategies on risk culture and strategic risk management. A firm with a high credit rating score will benefit from decreasing its borrowing cost and gaining investors and stakeholders trust (Hoyt and Liebenberg, 2011; Kleffner, Lee and McGannon, 2003; Beasley et al., 2005). S&P's did not come with a new ERM definition; however, they introduced two key analytic elements as the central part of their ERM rating. Hampton (2014) concluded that due to the broadness of the ERM concept, it is crucial to understand risks in this complicated business world clearly. He argues that while many organisations and industry professionals provided ERM evaluation guidance, S&P's evaluation remains the most effective (Hampton, 2014).

2.9 Current State of ERM: Evidence from Big Four Audit Firms

Pressure for changing the traditional risk management approach has emerged from different sources such as Sarbanes-Oxley, internal auditing firms, the Delaware court, activist shareholders, and rating agencies (Havenga and Venter, 2007; Lundqvist, 2014; Khan et al., 2016; Eryilmaz, 2018). Another primary reason behind the rise of ERM is the 2008 financial

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crisis that led to severe losses and failure in many organisations, including those with established risk management programmes. Consequently, companies started to understand the crucial need for changing their current risk management approach. While TRM is mainly focused on financial risk, credit risk and liquidity risk, the enterprise risk management considers a company-wide perspective and addresses risks comprehensively (Gates, 2006; Schroeder and Jackson, 2007; Simona-Iulia, 2014; McShane, 2018; Ogutu et al., 2018; Malik et al., 2020).

In 2013 Oliver Wyman and the Association for Financial Professionals (AFP, 2013; Oliver Wyman, 2013) used a survey to investigate the risk landscape for treasury and finance functions as well as for organisations as a whole in North America. Fifty-nine per cent of their respondents reported that their firms are exposed to higher earnings volatility compared to the preceding five years. Almost two-thirds of the survey participants stated that they had been exposed to more risks compared to the previous five years, and they expected it to be more difficult in the upcoming years. Nonetheless. 12% of the respondent stated that they are operating under lower risk exposure.

Moreover, the survey examined the firm's readiness for various types of risks on earnings such as customer satisfaction and capture, GDP growth, legal risks, political threats, energy prices fluctuation, HR problems, and hazards. Forty-five per cent of the participants claimed that they could foresee several types of risks effectively; however, the other 45 % reported that they need improvement; the 10 per cent left felt incapable (AFP, 2013). The survey explicitly revealed that firms understood the importance of transforming their current risk management programmes into a more integrative and holistic approach.

According to Deloitte 2018 Global Risk Management Survey (Deloitte, 2018), 83 per cent of the senior executives who participated in their study revealed that they have an ERM

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programme in place which is higher by 10% compared to 2017. The survey responses showed that many firms all over the world had understood the importance of having an integrative risk management approach (Deloitte, 2018).

Another key finding of the survey is that more than half of the respondents indicated that cybersecurity risk is going to be an increasing threat for their businesses over the next few years. Nevertheless, about one-half of the respondents said that their firms were extremely or very effective in managing this particular risk. Concerning other types of risk, most of the survey participants stated that their firms are extremely or very effective in addressing traditional risks such as market risk (92 %), credit risk (89 %), asset and liability risk (87 %), and liquidity risks(87 %). Conversely, roughly 50% of the participants stated that their firms are capable of extremely or effectively manage the following risks: reputational risk (57 %), operational risk (56 %), business resilience risk (54 %), model risk (51 %), conduct and culture risk (50 %), strategic risk (46 %), third-party risk (40 %), geopolitical risk (35 %), and data integrity risk (34 %). Deloitte (2018) concluded that financial institutions must consider implementing a holistic risk management approach for managing non-financial risks.

Recently, considerable literature has grown up on the appointment of Chief Risk Officer as evidence of a high ERM implementation stage (Daud and Yazid, 2010; Mikes, 2011; Pagach and Warr, 2011; Eikenhout, 2015; Bailey; 2019). According to Deloitte 2018 survey, 95% of the survey respondents have a CRO or an equivalent senior executive overseeing their ERM programme. Similarly, a study by McKinsey and Company (2012) revealed that a large number of financial companies appointed a Chief Risk Officer whereas companies in the non-financial sector still allocate the responsibility of risk management for the CFO. Furthermore, they found that the aim of enhancing ERM differs from one industry to another. For instance, insurance firms are eager to upgrade their risk culture, data infrastructure and information technology.

Conversely, non-financial firms are mainly interested in supporting decisions related to risks and risk management (McKinsey and Company, 2012).

In 2017 KPMG carried out a confidential benchmarking survey to examine the current state of ERM practices across a wide range of industries. The data were collected using interviews with ERM executives in a sample of 10 companies that belong to different sectors (KPMG, 2017). The findings of their study indicate that the majority of the respondents have a clear desire to enhance the foundational elements of their ERM programmes, taking into consideration a cogent allocation of resources. Even though a few companies in the study indicated that they have a mature ERM programme in place, most of the respondent's claimed that they encountered investment and change management problems (KPMJ, 2017).

In the same vein, in association with the American Institute of Certified Public Accountants (AICPA), North Carolina State University conducted an online survey to obtain a clear understanding of the current state of ERM in a number of organisations of different types and sizes (Beasley et al., 2019). The online survey was sent to all the firms that have a membership in the AICPA, and it mainly targets those who serve in the C-suite positions (CEO, CFO, and CRO). In total, the study was able to collect 445 complete surveys from different members. When asked about their current stage of the risk management process, more than 35% stated that they either do not have a structured risk identification process, or they address risks using a traditional risk management approach. Another 30% indicated that their risk management processes are informal and disintegrated with ad hoc reporting to the board of directors. Surprisingly, just over one-third of the participants stated that their risk management process is holistic, effective, and repeatable with standard reporting of the main risks to the board.

Although ERM has seen an increasing development over the last two decades, much still need to be done. Despite all the overwhelming incentives and benefits of ERM adoption, such as supporting shareholders value creation and the decision-making process (Lam, 2017), yet its implementation is still slow, especially in the non-financial sector. The following section provides an overview of ERM empirical studies and the available findings of the value of its implementation in the firms.

2.10 ERM in the Energy and Natural Resources Sector

The volatile political situation, the increase in health and safety hazards, infrastructure degradation, power failures are a small example of the danger that the energy and natural resources sector faces every day. The 2008 global financial crisis that started in the US and spread to Europe as well as other countries, still has a distressful vestige on many firms in the sector. Despite the effectiveness of some traditional risk management (TRM) activities, the extent, complexity and synergy of emerging risks are driving a large number of energy and natural resources firms to embrace a holistic and integrated risk management approach.

In 2014, Deloitte produced their first detailed survey on the extent of ERM implementation in the energy and natural resource industry. The main purpose of their survey was to assess the current state of ERM programme in the firms. In addition, the survey attempts to help firms that belong to this sector in recognising the emerging risks and uncertainties that could affect their core business (Deloitte, 2014). The results of their study indicated that 82% of respondents have an ERM program in place. The rest of the respondents who did not have an ERM programme (18%) had indicated different reasons. Forty-seven per cent stated that the main reason for not having any ERM activities in place is that it has not been placed as a priority in their board of directors agendas. Almost one-quarter claimed that the scarcity of resources (budget, human resources) is the main reason behind the absence of ERM practices in their firms. Only 6% claimed that they do not see the value of implementing an ERM program.

Deloitte (2014) suggested that the dramatic increase in ERM implementation globally is due to the regulatory compliance pressure and the increased complexity in multijurisdictional obligations. For instance, the EU Corporate Governance regulations have incorporated risk management for more than eight years some of them for more than a decade, for example, "the UK since 1992, the Netherlands since 1997, Germany since 2000, France since 2002, and Belgium since 2004" (Deloitte, 2014).

In 2015, Walker (2015) was the first of many investigators to demonstrate the state of ERM in the North American energy sector. Using a survey that has been sent to more than 100 firms, he found that more than 70% of the respondents have a CRO position in their firms, half of them have a management-level risk committee, and half of them claimed that they have a clear risk appetite statement. Walker (2015) results are consistent with the outcomes of Deloitte (2014) survey, as they explicitly indicate that ERM is witnessing an increasing development in the energy sector. Walker (2015) concluded that "ERM has been shown to lead to greater value and companies may want to get expert help to further develop their ERM processes".

In 2007 the Asset Performance Network examined the effectiveness of traditional risk management activities in the oil and gas sector. They focused their research on empirical evidence collected from different oil and gas firms as well as several case studies of renowned companies. Similar to many previous studies in the risk management and insurance literature (Meulbroek, 2002; Guay and Kothari, 2003; Jin and Jorion, 2006; Hoyt and Liebenberg, 2011), they proved that traditional risk management is insufficient to support companies in overcoming complex risks, especially in the oil and gas firms (Brett, and Jackson, 2007).

In the same vein, Rogers and Ethridge, 2016 investigated whether companies are abiding with the requirements identified by the US Securities and Exchange Commission (SEC), which oblige firms to include information in their annual reports about their board involvement in risk oversight. After analysing the annual reports of six large oil and gas companies (ExxonMobil,

Chevron, ConocoPhillips, Baker Hughes, Valero Energy, and Frontier Oil Corporation), they found that all the six companies complied with the requirements and included a section in their reports about the board of director's involvement in overseeing their risk management programmes. Although Rogers and Ethridge (2016) study provided significant contributions, yet they failed to identify firms who appointed a CRO in their sample. This could be because many companies do not disclose these types of information in their annual reports, or they hire other senior executives to oversee their ERM, such as CFO.

Among the research on ERM in the energy sector, perhaps the most well-known work is that of MacKay and Moeller (2007). In their seminal work, they assess whether corporate risk management adds firm value by examining its effect on firm cost and revenue efficiency in a sample of 34 oil refiners (n= 34) in the US. Using a cross-sectional regression for revenues and costs, relating them to the output and input prices, they found that traditional risk management activities (hedging) depressed sales, leaving concave expenses open, each represents between 2% and 3% of firm value. MacKay and Moeller (2007) ratified their method by regressing the firm value proxy (Tobin's Q) on the estimated value and level of risk management and found results consistent with the conceptual framework. Although the research methodology of MacKay and Moeller (2007) is complex and their research is highly focused on hedging activities, yet their approach was endorsed by other researchers in ERM literature (see Grace et al., 2010).

In summary, most of the risk management studies on the energy and natural resources sector mainly examined the current state of ERM in the firms. Besides, the available studies are predominantly investigated by auditing companies and professional bodies. Most of the published work on risk management in this particular sector focused on the effect of traditional risk management activities on firm value (See, MacKay and Moeller, 2007; Jin and Jorion, 2006, Petersen and Thiagarajan, 2000; Tufano et al., 1996). Given the lack of studies in the

scholarly literature that addressed the value of ERM in the energy and natural resources firms, this thesis seeks to obtain data that will help to address these gaps.

2.11 Identifying ERM Implementation in the Organisations

In recent years, researchers have shown an increased interest in implementing and the determinants of enterprise risk management (McShane, 2018; Bohnert et al., 2019; Ojeka et al., 2019). The publications in the ERM literature are divided into two main categories. Firstly, those studying the effect of ERM on firm value (see, e. g., Hoyt and Liebenberg, 2008, 2011; Beasley et al., 2008; Gordon et al., 2009; Pagach and Warr, 2010; McShane et al., 2011; Tahir and Razali, 2011; Lin et al., 2012; Quon et al., 2012; Baxter et al., 2013; Wu et al., 2014; Nair et al., 2014; Farrell and Gallagher, 2015; Grace et al., 2015; Sekerci, 2015; Agustina and Baroroh, 2016; Bohnert et al., 2019; Phan et al., 2020). Secondly, those who investigated firm characteristics associate with the implementation of the ERM programme; or as many scholars referred to it in the literature, "the determinants of ERM successful implementation" (see Liebenberg and Hoyt, 2003; Beasley et al., 2005; Desender, 2011; Pagach and Warr, 2011; Razali et al., 2011; Golshan and Rasid, 2012; Ganesh and Kanahai, 2014; Farrell and Gallagher, 2015; Sekerci, 2015; Ai et al., 2016; Mardessi and Daoud, 2017; Bohnert et al., 2017; Lechner and Gatzert, 2017).

One of the main challenges that face ERM scholars who published in the risk management and insurance literature is identifying firms that have an ERM programme in place. Thus they attempt to measure ERM implementation using several methods. The first method which has been prevalent in several studies is searching for evidence of hiring a Chief Risk Officer or a Senior Manager responsible for ERM oversight as an indicator of ERM presence (see Liebenberg and Hoyt, 2003; Beasley et al., 2008; Pagach and Warr, 2008; and Pagach and Warr, 2011; Eikenhout, 2015; Florio and Leoni, 2017). Nevertheless, several scholars

considered the presence of CRO role in an organisation as "insufficient evidence" of ERM adoption (Sekerci and Pagach, 2019) because many firms appoint Chief Risk Officers without having an ERM programme. The second method which has been widely used ERM literature for identifying ERM adoption is to search for "Keywords" related to ERM in secondary sources such as annual reports and companies databases. For instances, researchers use various databases such as Down-Jones, Compustat, Lexis Nexis by searching for keywords, like "CRO", "ERM", "enterprise risk management" and "Holistic risk management approach" (Hoyt and Liebenberg, 2011; Tahir and Razali, 2011; Eckles et al., 2014; Beasley et al., 2008; Liebenberg and Hoyt, 2003; Pagach and Warr, 2010). Although more than 35% of the ERM researchers relied on secondary data (see Kraus and Lehner, 2012) yet, this method suffers from some severe limitation.

The third method for identifying whether firms are practising ERM is using Standard & Poor's ratings as a proxy for ERM adoption. Many scholars have used this approach (see Baxter et al., 2013; and McShane et al., 2011; Pooser, 2012). The only weakness of this method is that S and P's ratings are available mainly for firms that belong to the financial services industry. In other words, this method will limit ERM research on studying the financial industry only. The last method that has been used by a few researchers in the area is employing a survey tool for measuring ERM implementation stage from the firms directly. This method has been used in the seminal work of Beasley et al. (2005), who sent an online survey for a list of companies asking them to score their ERM implementation level from 1 to 5. The main strength of using this technique is that it enables authors to collect more accurate information about the companies compared to secondary data. One limitation of this approach is that some managers may deliberately exaggerate the level of their ERM programmes which could lead to biased results (Sekerci and Pagach, 2019).

Given that the lack of an agreeable ERM identification method is hindering the development of ERM research, this section will examine the ERM measurement tools available in the literature in order to find a solution for the problem.

2.11.1 Proxy Search

A Large number of published studies used ERM proxy such as "Enterprise Risk Management Keyword" as an indicator of an ERM implementation in a firm. Scholars scanned companies databases, annual reports, and companies press releases for keywords and phrases as evidence of an established ERM programme (see Liebenberg and Hoyt, 2003; Beasley et al., 2008; Pagach and Warr, 2010; Hoyt and Liebenberg, 2011; Tahir and Razali, 2011; Eckles et al., 2014). More than 35 % of the studies on ERM implementation used proxy search methodology (Kraus and Lehner, 2012). Researches searched for evidence of the hiring announcement of the Chief Risk Officer as an indicator of ERM implementation, as well as other words equivalent to ERM. The following list includes the main keywords that had been used by the researchers in the field:

- "Enterprise risk management" or "ERM."

- "Corporate Risk Management"

- "Enterprise-Wide Risk Management"

- "Chief Risk Officer" or CRO

- "Risk Committee"

- "Strategic Risk Management"

- "Consolidated Risk Management"

- "Holistic Risk Management"

- "Integrated Risk Management"

The limitation of this approach is that a proxy search cannot measure the different forms of Enterprise Risk Management implementation. Another major problem is that Chief Risk Officer might not be in charge of overseeing the ERM programme of the firm. Also, while financial firms or insurance companies may hire CRO to manage their risk processes, many non-financial organisations appoint a CFO to implement their ERM programme (see McKinsey and Co; 2012). Furthermore, a proxy search is incapable of measuring ERM implementation. Surprisingly, the trend of using a proxy to identify whether the firm has an established ERM programme or not is still being used by a large number of scholars (Fraser and Simkins, 2010; Mikes and Kaplan, 2013).

For example, Lechner and Gatzert (2017) conducted a study to analyse firm characteristics that influence the implementation of ERM and to examine the effect of ERM on firm value in a sample of companies listed in the German stock exchange. Building on the work of Hoyt and Liebenberg (2011) and Pagach and Warr (2011), they performed a detailed keyword search, using the following terms: "ERM", "CRO", "COSO", "risk committee", "holistic risk management" and "Integrated risk management". Each successful finding was coded with a dummy variable (ERM = 1, otherwise 0). Their study results indicated that size, international diversification, and the industry sector are positively associated with ERM implementation, while leverage has a negative relation with ERM engagement. Further, the results confirm that ERM supports firm value.

2.11.2 ERM Measurement Using S&P's Global Ratings

Numerous studies have attempted to measure enterprise risk management using Standard and Poor's rating (See table 2.6). In 2006, Standards and Poor's developed assessment criteria for measuring the ERM implementation level in insurance companies (S&P's, 2006). They split up their ERM scoring scale into four main categories: weak, adequate, strong and excellent.

Three years later, S&P's upgraded their ERM scoring into: weak, adequate, adequate with risk control, strong, and very strong (S&P's, 2009). According to their assessment criteria, the weak and adequate score can be identified as tradition risk management while strong and excellent score indicated evidence of enterprise risk management.

Score	Assessment	Guideline
ERM Assessment		
1	Very Strong	Positive score for all subfactors and economic capital model (ECM) is assessed either "good" or "superior" under our criteria.
2	Strong	The risk management culture, risk controls, and strategic risk management subfactors are scored positive, one or both of the other two subfactors is scored neutral, and no subfactor is scored negative.
3	Adequate with strong risk control	The risk controls subfactor is scored positive, the strategic risk management subfactor is scored neutral, and no subfactor is scored negative.
4	Adequate	The risk controls and risk management culture subfactors are scored at least neutral; overall doesn't satisfy the requirement for adequate with strong risk control.
5	Weak	One or both of the risk controls and risk management culture subfactors are scored negative.

Figure 2. 7 S&P's ERM framework assessment guidelines (Adopted from S&P's, 2013)

One of the most cited studies using S and P's ratings to measure ERM score is that of McShane et al. (2012). Using a sample of 82 US insurance listed companies, he studied the effect of ERM stage on firm value. By using Tobin's Q as a firm value measurement, they found a positive relationship between "score 1: weak, and score 2: adequate" and firm value. However, there was no evidence of value creation in firms that scored strong and excellent. The results of their research are surprising, in which "weak and adequate" refer to traditional risk management (S&P's, 2013). Unlike McShane et al. (2012), using a similar methodology and a

larger sample (n=165), Baxter et al. (2013) found a significant relationship between a high-quality enterprise risk management scoring and ROA and Tobin's Q in the financial sector.

In the same vein of literature Pooser (2012) examined the relationship between ERM scoring and firm performance in the US insurance firms using S&P's rating as well as NIAC property and casualty insurance annual statement, to measure ERM level. Their research findings showed that firms with higher ERM rating reported fewer shocks and higher performance. In contrast to Pooser, Lin et al. (2012) found that insurance companies with higher reinsurance purchases, more options usage, and broad diversification, have a higher tendency to implementing enterprise risk management. The most striking result to emerge from the data is that the market reacted negatively to ERM implementation. Furthermore, a negative relationship between ERM and firm value was reported (ROA and Tobin's Q).

Recently Bohnert et al. (2019) studied 41 European insurance companies in order to analyse ERM determinants and ERM influence on firm value. To identify ERM activities, they used S&P's ratings. Their finding provided strong empirical support about ERM ability to enhance firm value. In other words, they found that Tobin's Q of the firms with higher ERM ratings is higher by 6.5% than those who have lower ERM ratings.

2.11.3 Enterprise Risk Management: Index Research
The considerable amount of limitations in measuring ERM implementation in previous studies led many scholars to develop a new ERM scoring method, entitled ERM index (Mikes and Kaplan, 2013). The ERM scoring index was developed by each scholar using establish ERM frameworks and other published data to identify the main components (e.g. Gordon et al., 2009; Quon et al., 2012; Grace et al., 2015; Ai Ping and Muthuveloo, 2015; Panicker, 2016; Sithipolvanichgul, 2016).

For example, Ai Ping and Muthuveloo (2015), Gordon et al. (2009) and Desender and Lafuente (2011) adopted the COSO ERM framework for developing their ERM index. Similarly, Quon et al. (2012) designed their unique specific index, while Grace et al. (2015) used a mix between the keyword method and their index. Gordon et al. (2009) established a COSO ERM effectiveness scoring method, which focuses on firm capability in achieving its four main objectives: strategy, operation, reporting, and compliance. The index scored the efficiency of enterprise risk management using the following methods:

1. Strategy 1 = the number of standard deviations in its sales deviates from the industry sales

2. Strategy 2 = a firm's reduction in beta risks, relative to the other firms in the same Industry

3. Operation 1 = (Sales) /(Total Assets); Operation2 = (Sales) / (Number of Employees)

4. Reporting 1 = (Material Weakness) + (Auditor Opinion)+ (Restatement); Reporting two = the relative proportion of the absolute value of normal accruals divided by the sum of the absolute value of normal and abnormal accruals

5. Compliance 1 = Compliance1: Auditor Fees/ Total Assets; Compliance 2 = settlement net gains (losses) to total assets

In the same vein, Panicker (2016), conducted an empirical study that focused on the relationship between ERMI (enterprise risk management Index) and firm performance in a sample of 30 IT companies listed in the Bombay stock exchange. While Developing ERM index, Panicker (2016), adopted Gordon et al. (2009) COSO effectiveness Index. The outcomes of her study showed a positive relationship between ERMI and firm performance. Further, she found a negative correlation between firm size and firm performance.

Another popular method is that of Desender and Lafuente (2009), who developed an ERM index questionnaire using the eight components of the COSO ERM framework. In 2010 they upgraded their method where they used a combination of ERM index and keyword search to identify ERM implementation and effectiveness in their sample. The results of their three-step methodology was a list of 108 ERM scoring questions covering all the eight components of COSO framework (2004) (see, Desender and Lafuente, 2011). Although they succeeded in finding a positive relationship between ownership structures, the board of directors, audit scope and the presence of ERM, however, their research is limited to the usage of secondary data (annual reports search, and Companies websites).

Ai Ping and Muthuveloo (2015) examined the influence of ERM implementation on firm performance in Malaysia. Their study examined the impact of ERM index and several control variables on firm performance. Unlike Desender and Lafuente (2010), their ERM index was established using a questionnaire survey. Their finding revealed a positive relationship between ERM implementation and firm performance. Interestingly, monitoring by the board, firm size and firm complexity were found to affect the relationship between ERM and firm performance positively. Inconsistent with many scholars, Quon et al. (2012) developed their unique ERM index to examine the effect of ERM on firm performance in a number of non-financial firms listed in the Toronto Stock Exchange (TSX). In addition, they did a contents analysis for the risk management information available in the firm's annual reports. Their research concluded that ERM does not have a significant relationship with firm performance.

Similarly, Grace et al. (2015) conduct a study to determine which aspect of ERM adds firm value. The research was based on an ERM survey by Tillinghast Towers Perrin, which they have sent to their US insurance clients between 2004 and 2006. 30 to 36 % of the survey participants belong to the public liability US insurance industry, and 43 to 45 % are US life

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insurance firms. Their ERM scoring index consists of eight items: 1. the economic capital model (ECM), 2. market value financial metric, 3. dedicated risk manager, 4. risk manager report to the board 5. risk manager report to the committee, 6. ERM in incentive compensation, 7. risk reflected in the decision, 8. ECM maturity. The outcomes suggest that ERM activities lead to a rise in cost and revenue efficiency.

Table 2. 7 Method for Investigative ERM Adoption in the Literature

Methods for Investigating ERM adoption in firms	
Secondary research (published data)	Survey
Liebenberg and Hoyt (2003)	Colquitt et al. (1999)
Hoyt and Liebenberg (2008)	Kleffner et al. (2003)
Gordon et al. (2009)	Beasley et al. (2005)
Pagach and Warr (2010)	Beasley et al. (2009)
Hoyt and Liebenberg (2011)	Beasley et al. (2010)
McShane et al. (2011)	Daud et al. (2010)
Pagach and Warr (2011)	Daud et al. (2011)
Razali et al. (2011)	Altuntas et al. (2011)
Tahir and Razali (2011)	Yazid et al. (2011)
Golshan and Rasid (2012)	Gates et al. (2012)
Eikenhout (2015)	Grace et al. (2015)
Lechner and Gatzert (2017)	Ai Ping and Muthuveloo (2015)
Bohnert et al. (2019)	Callahan and Soileau (2017)
Phan et al. (2020)	Saeidi et al. (2019)

Source: (adapted from Gatzert et al., 2015)

2.12 ERM and Value Creation (Empirical studies)

In order to confirm the value of ERM adoption as stated by the portfolio theory, the empirical literature examined the effect of ERM on firm value (see Gatzert and Martin, 2015; Bohnert et al., 2017; for a review). A group of previous studies found a significant positive relationship between ERM and firm value, for instance, Hoyt and Liebenberg (2008, 2011, 2015), Baxter et al. (2013), Akbari et al. (2013), Bertinetti et al. (2013), Farrell and Gallagher (2015), Ai et al. (2016), Bohnert et al. (2017), Lechner and Gatzert (2017), Anton (2018), Chuang et al. (2019). Another group found positive but not statistically significant results, for example, Tahir

and Razali (2011), Li et al. (2014), and Sekerci (2015). Contrary to previously published studies, Lin et al. (2012), Sayilir and Farhan (2017), Abdullah et al. (2017) found a significant negative relationship between ERM adoption and firm value in the firms.

Although the previous ERM studies are different in several factors such as their samples data (industry focus, region, time scales) and their control variables, the majority of authors used Tobin's Q as a proxy for firm value (see, e. g., Hoyt and Liebenberg, 2011; Lechner and Gatzert, 2018; Bohnert et al., 2017).

One of the most cited studies is that of Hoyt and Liebenberg (2011, 2015), who focused their research on the insurance sector. They provided a comparison between ERM and non-ERM adopting firms in terms of their ability to create firm value. In order to identify firms that have an ERM programme in place, they followed Liebenberg and Hoyt (2003), where they scanned annual reports and other publicly available sources for ERM keywords. The outcomes of their study showed a positive and statistically significant relationship between ERM adoption and firm value in which they reported an increase of approximately 17 to 20 per cent in Tobin's Q when ERM is present. The results of Liebenberg and Hoyt (2011, 2015) study supports the early findings of the Economist Intelligence Unit and MMC, which revealed that ERM is capable of creating shareholders value by reducing the weighted average cost of capital and increasing the organisation price to earnings ratio (EI and MMC, 2001; Banham, 2004). The pioneering work of Hoyt and Liebenberg (2011, 2015) remains crucial to the understanding of ERM and firm value; however, the study would have been more interesting if they used primary data collection instead of keywords search for investigating ERM presence.

In another major study, Farrell and Gallagher (2015), used data from the Risk and Insurance Management Society (RIMS) Risk Maturity Model (RMM) for analysing the impact of ERM implementation on firm value. RIMS and RMM data provides scores for the maturity of the

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firm's ERM programme using five points scales. The study found that firms with an upper maturity level of ERM are associated with higher firm value. Further, Farrell and Gallagher (2015) noted that that key aspect of ERM that are taken into consideration during ERM valuation is the C-suite executive engagement and the risk management culture throughout the organisation. Even though Farrell and Gallagher (2015) relied on secondary data, which is considered the main limitation of many studies in the area, nevertheless, examining different ERM maturity level provided a clearer insight into the value of ERM implementation.

In Taiwan, Chen et al. (2019), primarily examined whether financial firms benefit from ERM implementation and to what extent ERM practices create firm value. Consistent with many previous empirical investigations, they found that firms that have an ERM programme in places benefits by increasing 3.18 per cent value compared to non-ERM users. Also, they concluded that ERM adoption significantly supports the firms in increasing their revenue and enhancing their cost efficiencies by 13.72 per cent and 15.65 per cent, respectively. Further, they reported that banks and property/liability (P/L) insurers who implemented an ERM programme have a higher capability to reduce cost and generate revenue compared to other Taiwanese financial firms.

Other researchers, however, who have looked at ERM and Firm value have found a weak association between them. For example, Pagach and Warr (2010) rejected their hypothesis which postulates that ERM is value-creating, claiming that they discovered a decline in the earnings volatility of companies that implemented ERM. They based their study on a sample of 106 announcements of Chief Risk Officers from LEXIS-NEXIS for the years 1992-2004. Interestingly, Pagach and Warr (2010) still defend the proposition that ERM is value-creating, suggesting that "ERM could take an extended period to implement and reap benefits from" (Pagach and Warr, 2010, p 18).

Similarly, Quon et al. (2012) examined the relationship of ERM and firm performance in a sample of non-financial firms listed in Toronto Stock Exchanges (TSX) from 2007 to 2008. They conducted a content analysis of the companies annual reports as an attempt to examine firm performance. While a considerable number of scholars mainly used Tobin's Q as a proxy for firm performance/value (see; Hoyt and Liebenberg, 2011, 2015; Tahir and Razali, 2011; McShane et al., 2011; Gatzert and Martin, 2015) Quon et al. (2012) partially differentiated their study from others by the using Tobin's Q and two other performance measure, EBIT and sales revenue. The result of their research shows no relationship between ERM and firm performance. Given that the period of Quon et al. (2012) research was during the financial crisis, and most of the companies all over the globe were struggling in terms of performance, one question rises on the degree of the accuracy of the research results and whether their study contribution can be generalised.

Consistent with Pagach and Warr (2010) and Quon et al. (2012), Abdullah et al. (2018) examined the impact of ERM on firm value in Malaysia. Using a sample of 26 Malaysian firms, they analysed the relationship between ERM and firm performance in the period of 2004 to 2012. The findings of their study indicated that ERM adoption has a negative and statistically significant relationship with firm value at 1 per cent. Abdullah et al. (2018) concluded that their findings support the argument of Bowling & Rieger (2005) and Gates (2006), which suggests that the value of ERM implementation is not immediately realised and ERM implementation process could incur the firms high costs.

Given the controversial results about the relationship between ERM and firm value, and the lack of understanding of the firm characteristics associated with its successful implementation, this study is set out to investigate these questions further. As can be seen from the empirical studies outlined in this section, most of the authors focused their research on insurance firms

in the US as well as other regions. Unlike the work of the majority of previous scholars, this study focuses on the effect of the adoption of ERM on firm value in the energy and natural resources firms listed in NYSE and NASDAQ. While many authors mainly used secondary data for identifying ERM adoption in the firms (see Hoyt and Liebenberg, 2008, 2011, 2015; Pagach and Warr, 2010, 2011; McShane et al., 2011; Razali et al., 2011; Tahir and Razali, 2011; Golshan and Rasid, 2012, Lechner and Gatzer, 2017; Bohnert et al., 2019., Phan et al., 2020), this study used a survey tool to collect data about the firms' ERM stage. Also, secondary data is used for collecting the firm value measurement proxy (Tobin's Q) and other control variables.

2.13 Determinants of Enterprise Risk Management

2.13.1 Board of Directors and ERM Implementation

One of the factors behind the successful implementation of ERM in organisations is the support it receives from corporate governance and compliance (Martens and Teuteberg, 2011; Renzi and Vagnani, 2020). In a study conducted by Berenbeim (2004), he showed that an effective ERM implementation is mainly induced through the endorsement of the company compliance department. This significant correlation between ERM and corporate governance is due to the extensive pressure that corporate governance receives from several parties to support the implementation of ERM in the firms. For instance, the Toronto Stock Exchange (TSX) guidance for effective corporate governance has significantly influenced firms risk management activities in Canada (Kleffner et al., 2003; Dey, 1994). TSX urged governance bodies to go beyond the silos risk management approach by adopting a holistic risk management programme. Also, it supported the regulatory bodies such as the Canadian Comprehensive Auditing Foundation (CCAF) and the Canadian Institute of Charted Accountants (CICA) during their early initiatives for promoting ERM. TSX contributed by

communicating the importance of these initiatives and by supporting organisations in enhancing their risk management reputation (Kleffner, 2003).

Another major cause that influences corporate governance to adopt ERM is regulatory pressure. Due to this factor, many companies entirely moved toward the integrative risk management approach (ERM) while some others partially implemented the programme. This type of regulatory acts that promote the implementation of ERM is common in several countries (Collier et al., 2007). Examples of such regulatory laws include the NYSE Corporate Governance Rules (NYSE, 2014), the US SOX Act of 2002 (SOX, 2002) and the Nigerian SEC Code of Corporate Governance for Public Firms (Ibadin and Dabor, 2015). Most of these rules and regulations apply to public listed companies and impose effective risk management practices. Another primary purpose of these regulations is to urge firms to implement their comprehensive risk management initiatives if any, and to implement a robust risk management framework. Previously published studies on the effect of the COSO risk management framework and firm performance by Paape and Spekle (2012) revealed that most of the firms in their sample adopted ERM because of the regulatory environment and the ownership structure influences. Other studies proved a positive relationship between risk management alignment with the organisation's corporate governance/compliance and shareholder value creation (PricewaterhouseCoopers, 2004). An example of organisations that responded to the corporate governance rules and guidelines in North America is United Grains Growers (UGG) (see Kleffner et al., 2003). "UGG has taken the corporate governance guidelines of the Canadian regulatory agencies which require corporations to have a program in place to identify and manage risks quite seriously" (Green, 2001, p. 73). UGG applied the new regulation by implementing an integrative insurance approach that covered all its needs, including weather risks. According to UGG, the main benefit of the integrative insurance programme is that it

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lowers their exposure to revenues fluctuation, which in turn reduces their cost of risks (Green, 2001; Kleffner et al., 2003).

In addition, there has been a noticeable growth in the board's interest in risk management (Lam, 2006; Lipton et al., 2012; Ernst and Young, 2012). In 2009, Desender and Lafuente were the first of many scholars who demonstrates the relationship between the board composition and the stage of ERM implementation. Their research outcomes showed that the Chief Executive Officer position in the board has a significant effect on the stage of ERM in firms. Also, they found that the board of director by itself is not enough to increase ERM stage, and it is only strongly related to ERM when the title of CEO and Chairman are given to two different people (Jensen, 1993; Goyal and Park, 2002; Desender and Lafuente, 2009). Desender and Lafuente (2009) concluded that board independence and the separation of CEO and chairman positions leads to the highest stage of ERM implementation (see also Pagach and Warr, 2007).

Recently Sekerci and Pagach (2019) conducted a study to examine the relationship between ERM and corporate governance using survey data of 150 Nordic firms listed in Stockholm. They concluded that the existence of the ERM program is more likely in firms with specific corporate governance activities. For example, they found that board independence has a significant positive relationship with ERM process if the firm is board-driven. Further, they found that the board size is positively related to ERM adoption.

2.13.2 Chief Risk Officer and ERM Stage

In recent years, there has been a surge of interest in studying the impact of the presence of Chief Risk Officer (CRO) on the stage of ERM implementation in the firms. Recent evidence suggested that highly leveraged firms tend to appoint a CRO to reflect their ability to manage and control risks (Liebenberg and Hoyt, 2003; Bromiley et al., 2015). This is congruent with Pagach and Warr (2011), who argues that firms which face a higher risk of financial distress,

such as high leverage, a decline in company savings, higher earnings volatility and high fluctuation in their stock price, are more likely to hire a CRO.

In his landmark work, Beasley et al. (2005), used survey data to identify the main firm characteristics associated with the successful implementation of ERM programme. Their study found that an independent board of directors, the presence of big four audit firms and firm size are positively related to ERM implementation. Further, their study confirmed that the presence of the CRO role is associated with an upper ERM implementation stage. The findings of Beasley et al. (2005) regarding CRO are consistent with a considerable number of previous studies (Liebenberg and Hoyt, 2003; Pagach and Warr, 2011; Bailey, 2015, 2019; Al-Farsi, 2019) in this area.

In 2005, The Economist Intelligence Unit (2005) reported that many firms tend to appoint CRO to oversee their ERM programme. Similarly, Walker et al. (2002) claim that due to its scope and effect, ERM needs direct support from senior management. While a business unit may accept to take a specific risk, the firm as a whole may not. However, the presence of CRO position reduces these conflict, and it helps in balancing risks and inventory decisions to achieve the most favourable condition for stakeholders. Amoozegar et al. (2017) claim that the absence of a CRO's authority in financial institutions led to the failures of risk management in the recent crisis.

The absence of the CRO role and the cultural differences in the organisation are considered two of the main barriers to the successful implementation of ERM programme (Miccolis, 2003; Kimbrough and Componation, 2009). This is because they could lead to inconsistencies in ERM practices in the whole organisation (COSO, 2004). As an attempt to overcome these barriers, many firms, are hiring CROs as a member of the senior executives who is mainly responsible for overseeing ERM functions (Economist Intelligence Units, 2005). One of the

primary duties of CRO is to communicate the risk philosophy to stakeholders and to oversee the effectiveness of ERM deployment across the entire organisation. Many Scholars support this view (Beasley et al. 2005; Lam 2001) in which they suggest that appointing a member from the senior executives to oversee ERM activities is a sign that the board set the company risk management as one of its top priorities. Consistent with the literature, rating agencies, such as Standard and Poor's, include ERM leadership in their assessment and rating process of the firms (Standards&Poor's, 2005).

Unlike many studies in the ERM literature, Aabo et al. (2005) conducted a case study on Hydro One, which revealed that their CRO works part-time, and he invests only 20% of his time at Hydro One. The authors concluded that the appointment of CRO does not influence ERM effectiveness in the firm rather, the main reason behind ERM success in Hydro One lies in the company ability in making "risk management everyone's responsibility" (Aabo et al., 2005).

In their pioneering study, Liebenberg and Hoyt (2003) attempt to identify the main determinants of ERM adoption in a sample of US firms. They used the presence of CRO role as an indicator of ERM adoption by the firms through searching for CRO announcements on Lexis-Nexis. Their research outcomes show a lack of systematic differences between companies that hire CRO and other firms of a similar size and industry affiliation. Their empirical results also indicated that firms with higher leverage have a higher tendency to hire a CRO. Liebenberg and Hoyt (2003) postulate that firms that hire CROs, "derive greater value from the CRO's ability to reduce the costs associated with the risk-shifting problem and to communicate the firm's risk profile to external stakeholders" (Liebenberg and Hoyt, 2003, p. 51). Building on Liebenberg and Hoyt (2003), Beasley, Pagach and Warr (2008) conducted a study to examine the stock market reactions to announcements of CROs appointments. Using a sample of 120 announcements from 1992-2003, they did not find a positive relationship

between abnormal returns and the existence of CRO roles in both the financial and non-financial sector. However, they found that shareholders react positively to the existence of the ERM programme. This is because ERM creates firm value by reducing agency cost and overcoming market distortions. In addition, their research outcomes revealed that shareholders who belong to large firms with low or negative cash flow favour the implementation of ERM. Although Beasley et al. (2008) provided important empirical findings, yet their study is limited for the use of secondary data, which is incapable of measuring the stage of ERM implementation in the firms. Also, some firms may not announce the hiring of CRO, and others may give the total responsibility of overseeing ERM function to CFO, which also add another limitation to the accuracy of their data collection method.

In the same vein, Bailey (2015) examined the impact of the CRO role and risk committee members on achieving/implementing an effective ERM programme. The findings of their study showed that the CRO position leads to an increase in ERM quality. Also, it is associated with lower levels of total risk, strategic risk and internal control risk. Similarly, the risk committee members are also found to lower the levels of total risk as well as material weaknesses. Generally, the study suggested that the expertise of the CRO and the risk committee in overseeing the ERM programme are generating good results. In 2019, Bailey conducted another study to examine seven expertise of CRO on the quality of the ERM programme in the firms (Bailey, 2019). Similar to the results of her previous study (see Bailey, 2015), she found that the CRO role is strongly related to higher ERM effectiveness. Additional findings indicate that hiring a CRO was substantial during the financial crisis.

In a recent study, Al-Farsi (2019) investigated whether the CRO influences the effectiveness of ERM in a sample of 94 Omani publicly listed firms. Using an online survey that has been sent to the firm's senior managers, he found that there is a lack of understanding of ERM

procedures in the majority of the Omani publicly listed firms. Further, he found that ERM implementation is still in an immature stage in the country. Interestingly the study reported a significant positive relationship between the existence of the CRO position and the adoption of the ERM programme in his sample. The results of the study also indicated the oil prices volatility is considered one of the highest threats to the economy in Oman.

In summary, it can be seen from previous literature that the relationship between CRO and ERM effectiveness/stage in the firms is still controversial. Hence this study will examine this relationship further, including other ERM influential factors that are expected to do a change in ERM implementation stage.

2.13.3 Other ERM Determinants

In addition to the board of directors monitoring and the presence of CRO, many other ERM determinants have been examined in the literature. However, it is highly noticeable that the selection of ERM determinants is commonly based on the study's research questions (see Bohnert et al., 2017). For example, those who used a sample from the insurance sector in their studies have selected the variable "Industry sector" (see Hoyt and Liebenberg, 2011; Bohnert et al., 2017). Similarly, Authors who focused on the insurance sector examined the ERM determinants "Big Three Rating Firms" such as Standard & Poor's, Moody's or Fitch Ratings (see Lechner and Gatzert, 2017), which has not been identified in other studies that focused on different sectors. This could be because the Big Three rating firms are mainly active in the insurance and financial service industry.

Further, unlike many researchers who focused on one location in their investigation, those who examined a sample from more than one country used the variable "nation" in ERM determinant model (see Beasley et al., 2005; Golshan and Rasid, 2012; Lechner and Gatzert, 2017).

Despite the wide variety in the selection of ERM determinants in the literature, the variable "Firm size" has been the most predominant (see Baxter et al., 2013; Bohnert et al., 2017; Khumairoh and Agustina, 2017; Lechner and Gatzert, 2017; Ardasa et al., 2020). For measuring firm size, some studies relied on the total number of employee (Munro & Noori, 1988; Hsu et al., 2008), while the vast majority used the natural logarithm of total assets (Yazid et al., 2012). The ERM determinants that will be examined in this research are outlined in section 2.15.

Table 2. 8 Summary of Academic Research Articles on ERM

Authors	Year	Methodology	Findings	Data used
Pooser David M., Tobin Peter J.	2012	Empirical	Firms that have a rating form and S&P's for their ERM programme rating have a higher operational diversification and less liquidity than others. No relationship between ERM and firm value.	ERM is measured using S&P's rating
Sekerci Naciye	2013	Survey with quantitative analysis	The implementation of ERM does not create shareholders value.	Using a survey tool for identifying ERM adoption directly from the firms.
Teoh Ai Ping, Rajendran Muthuveloo	2015	Survey with quantitative data analysis	ERM adoption has a significant positive relationship with firm performance	A survey tool of 103 questionnaires that analyses ERM level based using COSO framework components.
Agustina, Linda; Kiswah Baroroh	2016	Empirical	ERM adoption does not influence firm performance.	ERM is measured using guidelines of risk management for commercial banks (secondary data). Other data, such as the performance measure are collected from annual reports.

Table 2. 8 Summary of Academic Research Articles on ERM (Continued)

Authors	Year	Methodology	Findings	Data used
Philipp Lechner, Nadine Gatzert	2017	Empirical	There is a positive relationship between ERM and firm performance.	ERM users are identified by conducting a keyword search in annual reports and other publicly available sources.
Cristina Florio, Giulia Leoni	2017	Empirical	The findings indicate that firms with an upper ERM stage have a higher firm performance.	ERM identified using contents analysis (secondary data) while another variable like firm performance measures is collected from AIDA databases.
Alexander Bohnert, Nadine Gatzert, Robert E. Hoyt, Philipp Lechner	2018	Empirical	The findings indicate that ERM adoption supports firm value in the European insurance sector.	ERM adoption is identified using S&P's ratings. Other variables and performance measurements are collected from financial databases.
Juliano Rodrigues da Silva, Aldy Fernandes da Silva & Betty Lilian Chan	2019	Empirical	The results show a positive relationship between an effective ERM programme and firm value.	ERM is identified using contents analysis of financial statements and annual reports. Other variables and performance measurements are collected from financial databases.
Thuy Duong Phan, Thu Hang Dang, Thi Dieu Thu Nguyen, Thi	2020	Empirical	ERM adoption increases firm value.	ERM is identified from annual reports, corporate websites and other databases.

(Created by the author, 2019)

2.14 Research Gap

Since the 2008 financial crisis, many new regulations emerged, which increased the rigorousness of regulatory obligations, especially those related to risk management and corporate governance. Many researchers, regulators and rating agencies attributed the

consequence of the crisis to the traditional risk management activities (see, Mitton, 2002; Jin, 2001; AIG, 2010; Deloitte, 2014, 2015, 2018). Consequently, companies in different sectors are facing high pressure from their stakeholders, public authorities and government agencies for developing a holistic risk management approach. As a result, a considerable number of authors started showing an increased interest in ERM related topics. Although the last two decades have seen a growing trend towards ERM, it is clearly noticeable that most of the ERM publications in the risk management literature are mainly concerned with the insurance and financial services companies (see Kleffner and Lee, 2003; Hoyt and Liebenberg, 2008, 2011; Acharyya, 2008; Pagach and Warr, 2010; Wu et al., 2014; Soliman and Adam, 2017; Lundqvist and Vilhelmsson, 2018; Altuntas et al., 2019). However, there is a paucity of ERM studies on the energy and natural resource sector, although it exposed to a wide range of risks such as "political instability, safety hazards, infrastructure degradation, operational outages, adverse weather events, greenhouse gas emissions" (Deloitte, 2014).

Moreover, the existing studies on ERM in the energy and natural resources sector suffer from several methodological limitations. For example, Aabo, Fraser and Simkins (2005) conducted a case study on a Canadian electrical utility company (Hydro one), and they found that the appointment of CRO does not significantly influence ERM successful implementation in the firm. However, they found that ERM success increased the company ratings by Moody's and S&P's. One issue with Aabo et al. (2005) study is the lack of a standardised outcome measure, which requires a cautious interpretation of their results. In the same vein, Jorion and Jin (2006) studied the effect of hedging activities on firm value (Tobin's Q) in a sample of 119 oil and gas companies in the US. Interestingly they found that the firm value of their companies is not affected whether the company hedge or not. They also found that hedging reduces stock prices fluctuations. The results of Jorion and Jin (2006) contradicts those of Allayannis and Weston

(2001), who conducted a similar study on a sample of 720 non-financial US firms and found a positive relationship between firm value and the use of foreign currency derivatives.

In addition, ERM studies that focused their samples on industries other than the energy and natural resources also suffers from mixed results regarding the value and the determinants of ERM implementation. For Example, Altunas, Stolzle and Hoyt (2011) researched the key factors that influence ERM implementation in a sample of German insurance firms. Consistent with the managerial career concern view, they found that adverse changes in past performance have a positive relationship with the implementation of ERM. Grace et al. (2015) found that firms that have a CRO role in place have higher cost-efficiency and a higher return on assets (ROA). However, their study was unable to prove that ERM adoption increases firm performance. In addition, their study was subject to some potential methodological weaknesses such as the lack of reliable firm performance proxy (Such as Tobin's Q).

Another significant gap in the risk management literature is the paucity of evidence on the main factors that influence the implementation/effectiveness of ERM programme. For instance, the results of Wyman (2005) survey, revealed that 90 % of senior executives from the US and Canadian boards of directors are actively interested in ERM implementation. Nevertheless, only 11% entirely implemented the programme. Similar to Wayman (2005), Brown et al. (2014) suggested that robust internal control and effective risk management are the key factors of financial disclosure transparency; however, the key determinants of effective ERM implementation are still not precise. This absence of clear empirical evidence about the main factor associated with the successful implementation of ERM may hinder the programme development and effectiveness.

The most important limitation in ERM literature lies in the fact that most of the previous studies have been restricted to the use of secondary data and ERM proxies for identifying ERM

adoption of by the firms (see Liebenberg and Hoyt, 2003; Beasley et al., 2008; Hoyt and Liebenberg, 2011, Pagach and Warr, 2011, Golshan and Rasid, 2012, Tahir and Razali, 2011; Eckles et al., 2014). The predominant use of secondary data in ERM studies has been severely criticised for accuracy. For example, Paape and Spekle (2012) used a published survey by PricewaterhouseCoopers for identifying the users and non-users of ERM programme. Surprisingly, they found that the adoption of the COSO framework does not enhance the effectiveness of the programme. In the same vein, Golshan and Rasid (2012) studied the determinants of ERM in Malaysia. Similar to many other renowned scholars (see Liebenberg and Hoyt, 2003; Pagach, Fraser and Simkins, 2010), they used CRO as a proxy for ERM existence in the firms. The outcomes of their study revealed that firms which are highly leveraged or working with big four internal auditors are more likely to adopt an ERM programme.

This study addresses these gap by developing a comprehensive survey tool which has been sent to 392 North American energy and natural resource companies listed in NYSE and NASDAQ. The primary purpose of the survey is to identify the stage of ERM adoption in the firms and to collect other critical information such as the influential factors of ERM implementations in this sector. The study aims to come up with clear numerical results that will indicate the impact of implementing ERM program on firm value, and the firm characteristics associated with its implementation. The findings of the study make several contributions to theory and the current literature. The conceptual framework of the study and the expected relationships are presented below.

2.15 Theoretical Framework and Hypothesis Development

To address the knowledge gap in ERM literature, this study aims to examine the effect of ERM adoption on firm value and to investigate the determinants of ERM implementation in the North

American energy and natural resources publicly traded firms. Therefore this study has four research questions.

The first research question is, *what is the current ERM implementation stage in the North American energy and natural resources publicly traded companies?* Due to the fact that this research question is descriptive, no correlational hypothesis has been assigned to it (see, Aggarwal and Ranganathan, 2019). However, the answer to this question is crucial for answering the following three research questions and further explaining the data analysis results.

The second research question is, *does the implementation of ERM in the North American energy and natural resources publicly traded companies positively affect their firm value?*

According to the value maximization theory, enterprise risk management implementation increases shareholder value creation (Lai, Azizzani and Samad, 2012; Kraus and Lehner, 2012). It is a commonly accepted notion that the shareholders are risk aversive, and they prefer firms that manage risks on their behalf (Lai, Azizzani and Samad, 2012). In his seminal work, Stulz (1996) explains that one of the several approaches in which ERM creates value is by lowering or completely removing the likelihood of adverse financial events, which automatically decreases the impact of "costly lower-tail outcomes". Lower tail outcomes are mainly losses and cash flow sensitivity due to financial distress. These outcomes may incur the firm's direct costs, such as negative earning and bankruptcy and indirect costs, such as reputational damages. ERM implementation allows the firms these threats, which helps in decreasing the firm's total risk (see Meulbroek, 2002; Hoyt and Liebenberg, 2011; Farrell and Gallagher, 2015; Lechner and Gatzert, 2017), and consequently smoother earnings as well as cash flow volatility (Nocco & Stulz, 2006).

Based on the argument of the value maximisation theory and following the prominent researchers in the ERM literature, this study hypothesises the following:

H1: The implementation of an enterprise risk management programme has a positive and significant relationship with firm value.

Previous studies suggest that corporate characteristics and financial health directly influence firms' ability to create shareholder value (Bohnert et al., 2017). Thus many ERM researchers investigated the impact of these factor on firm value. The most commonly examined value relevant characteristics in the ERM literature are firm size, leverage (see Hoyt and Lienbenberg, 2008, 2011; Tahir and Razali, 2011; Li et al., 2014; Horvey and Ankamah, 2020), sales growth (McShane, 2011; Farrell and Gallagher, 2015; Anton, 2018), return on assets (Allayannis and Weston, 2001; Zou, 2010; Baxter et al., 2013; Lechner and Gatzert, 2017) and dividends (Hoyt and Liebenberg, 2008, 2011; Zou, 2010; Farrell and Gallagher, 2015; Sekerci, 2015; Bohnert et al., 2017; Lechner and Gatzert, 2017). Therefore, based on the ERM reviewed literature and other related theoretical assumptions, this study postulates the following:

H2: There is a significant positive relationship between firm size and firm value.

H3: There is a significant negative relationship between leverage and firm value.

H4: There is a significant positive relationship between ROA and firm value.

H5: Firms that pay dividends for shareholders are more likely to have a higher firm value.

H6: Sales growth is expected to have a significant positive relationship with firm value.

The third research question is, *what are the firm's characteristics associated with ERM implementation in the North American energy and natural resources publicly traded companies?*

Proponents of the agency theory proposed several procedures that aim to align the interests of shareholders and senior executives (Descender, 2011). Some of these procedures include the implementation of internal control systems such as the independent board of directors monitoring (Fama and Jensen, 1983), monitoring by the institutional investor (Tosi and Gomez, 1989), managerial stock ownership (Jensen and Meckling, 1976; Tufano et al., 1996) and enhancing audit ability (Matsumura and Tucker, 1992). In addition, the agency theory argues that companies "engage in robust and explicit ERM processes both at the board and senior management levels to aid the board in advancing the maturity of its oversight of risk-taking on the part of management" (see Beasley, Branson and Pagach, 2015, p 221). The following presents the hypotheses development of ERM adoption determinants, motivated by the agency theory and the influential work in the literature.

Chief Risk Officer: In his seminal study, Lam (2001) introduced a senior executive role responsible for overseeing the firm's risk management, entitled "Chief Risk Officer" (CRO). Some scholars in the field argued that the absence of a CRO position in a firm does not mean that they do not have an ERM programme in place (see Liebenberg and Hoyt, 2003). ERM responsibility could be allocated to other senior executives such as the CEO or CFO. However, CRO is still included in most ERM implementation determinants as the main factors that influence ERM implementation decision (see Hoyt and Liebenberg, 2003; Kleffner et al., 2003; Yazid et al., 2011). Beasley et al. (2005) studied the firm characteristics that influence ERM adoption decision, and he found a significant relationship between CRO and ERM implementation. In line with Beasley et al. (2005), this study postulates the following:

H7: The presence of the CRO role has a significant relationship with ERM implementation.

Big Four Auditor: Many studies suggested that the type of internal auditing firms can influence the implementation of ERM programme (see Beasley et al., 2005; Golshan and Rasid,

2012, Gatzert and Lechner, 2017). It has been argued that if the auditing firm of the organisation is one of the big four (KPMG, EY, Deloitte or PricewaterhouseCoopers) the firm have a higher tendency to implement an ERM programme (see Golshan and Rasid, 2012). This is because big four auditing firms ensure that the annual reports of the organisations they work with are up to the highest standards in order to maintain their reputation (see Tolleson and Pai, 2011). Thus, this study argues the following:

H8: The presence of a big four auditing firm has a significant positive relationship with ERM implementation.

Board of Directors' Monitoring: To successfully implement an ERM programme, different parties at different levels in the organisation should participate in the process. COSO (2004) specified several governance members who have an essential role in ensuring that ERM is effectively implemented. It is argued that the ERM programme should be set as one of the top priorities on the board's agenda of the firm in order to operate efficiently (Kleffner et al., 2003; Shenkir & Walker, 2006; Daud & Yazid, 2009). This is congruent with Sobel & Reding (2004), who stated that an effective ERM programme is reliant on the board of director's engagement. Therefore this study postulates the following:

H9: Board of directors monitoring has a significant positive relationship with ERM implementation.

Institutional Ownership: Due to the increase in economic instability and especially after the 2008 financial crises, investors are asking for more information about the firm's risk appetite and the type of risks they are exposed to. This pressure from the investors increases when the majority of the shareholders are institutions. As a result of this, Institutional ownership attracted many ERM researchers (see Liebenberg and Hoyt, 2003; Pagach and Warr, 2011). However,

the relationship between institutional ownership and ERM adoption is still controversial. Thus, this study hypothesises the following:

H10: Firms with a high percentage of institutional ownership are more likely to implement an ERM programme.

Firm Size (Book value of total assets): As described before, a considerable number of studies found a positive relationship between firm size and ERM implementation. As a firm grows in size, its risk exposure starts to increase, which creates a need for ERM practices. Also, larger firms may have a higher capability to implement ERM programmes due to their greater resources (Colquitt et al., 1999). This study expects the following:

H11: Larger Firms are more likely to implement an ERM programme

Sales growth: Following most ERM studies in the literature, this study includes sales growth as a proxy of firm profitability in the determinants of ERM model (e.g., Pagach and Warr, 2011; Baxter et al., 2013; Pagach and Sekerci, 2019). This study postulates the following:

H12: A firm with high sales growth are more likely to implement an ERM programme.

Leverage: According to Smith and Stulz (1985), risk management positively impacts firm value by lowering financial distress costs. Given that firms with higher debts normally faces financial distress more than those who are unlevered, it is commonly presumed that highly levered firms are more likely to prioritise risk management. Therefore following previous studies (Hoyt and Liebenberg, 2011) this researcher postulates the following:

H13: Highly leveraged firms are more likely to implement an ERM programme.

The fourth research question is, *does the organisations' risk culture significantly influence ERM deployment in the North American energy and natural resources publicly traded*

companies? In what follows, a theoretical framework and the hypothesis development are presented.

Culture is included in several ERM frameworks, although authors referred to it using different words. For instance, "organisational context" (see Secretariat of ISO TMB WG on Risk Management, 2007), "establishing context" (see CAS, 2001) and "risk culture" (Gates and Hexter, 2005). According to Deloitte (2012, p 13), a fully developed Risk Intelligent Enterprise should view risk management "not as a project but part of the culture, the way of doing business". Thus, building on the pioneering work of Kimbrough and Componation (2009), this study postulates the following:

H14: Risk Culture has a positive and significant relationship with an upper ERM stage.

The following subsection presents the conceptual model of the overall conceptual model of the study include the hypothesis.

2.15.1 Conceptual Framework

This figure represented below is the conceptual framework of the study, which includes ERM and firm value assumption and ERM determinants assumption. As can be seen, the study examines two main models. The first model is the effect of ERM on firm value, which is represented by hypothesis one (H1). The control variables of ERM and firm value model are firm size, leverage, ROA, dividends and sales growth represented by H2, H3, H4, H5, and H6, respectively.

The second model is the determinants of ERM, including the variable, CRO, big four audit firms, the board of director monitoring, institutional pressure, firm size, sale growth, leverage and risk culture. The variables are presented by H7, H8, H9, H10, H11, H12, H13 and H 14, respectively.

The two models are presented separately in two different conceptual models in the research methodology chapter (section 3.10). The variables shown in figure 2.8 has been derived from the theoretical review (section 2.15).
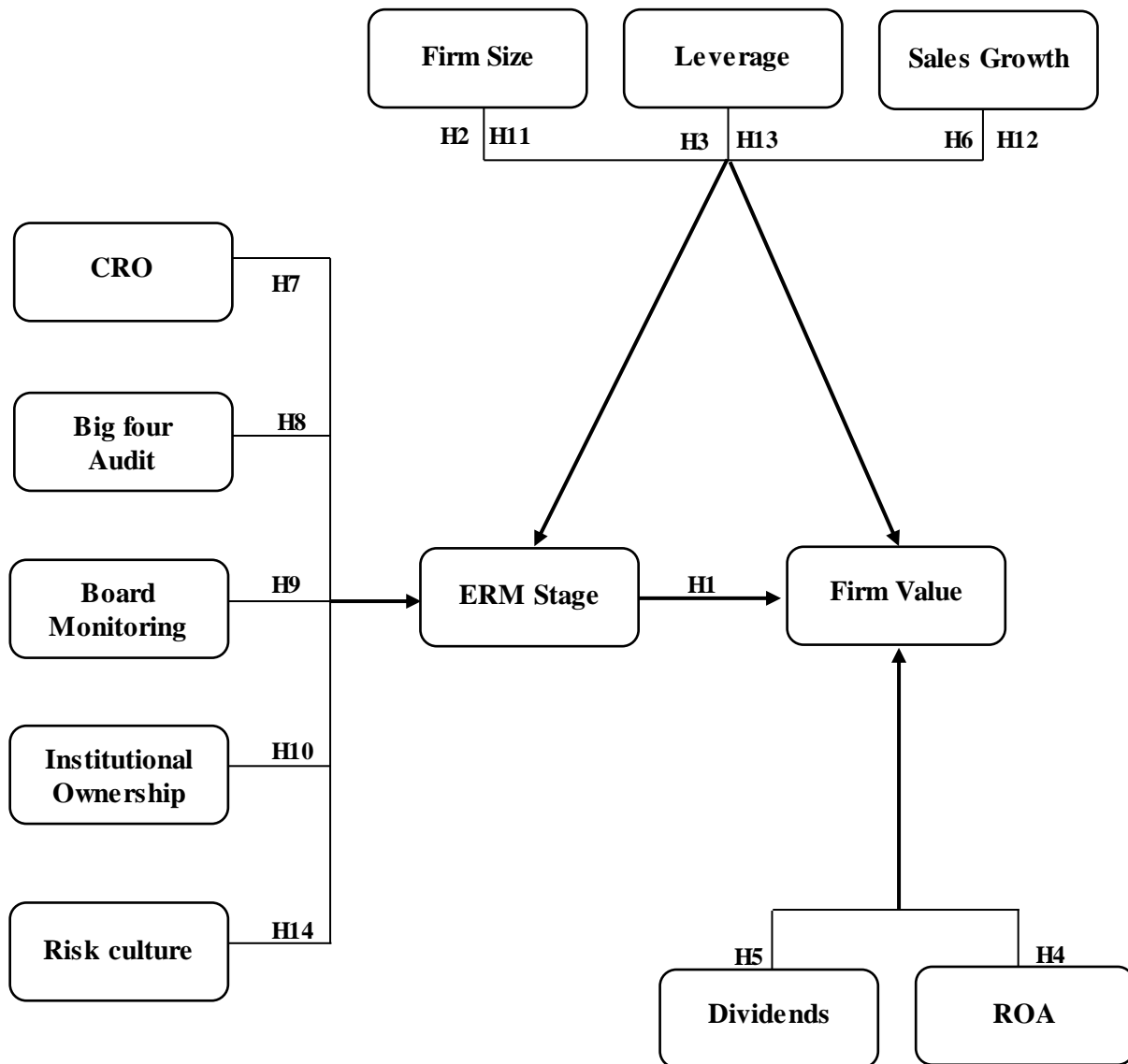
Figure 2.8 the conceptual framework of the study

2.16 Summary

Today, the global economic environment is more volatile and uncertain than ever before. The increased globalisation and cultural convergence led to a volatile business environment which made firms more concerned about consumer behaviour and customer loyalty. Many new risks have emerged, such as the speed of new technology development, an increase in global population, labour market changes, weather changes, and the shortage of natural resource. These risks are hindering firms' ability to create shareholders value which is keeping many investors on hold from investing in new projects. Consequently, several regulators, rating agencies, and auditing firms advocated the implementation of Enterprise Risk Management (ERM) as a solution for these problems (see, The Economist, 2004; Moody's, 2012, Standard & Poor's, 2013; Deloitte, 2014). Unlike the traditional risk management approach that manages risk in silos, ERM programme manages the firm's risks holistically. In addition, ERM helps in fostering effective management decisions and in creating firm value (Lam, 2017).

This chapter provides a summary of the literature relating to ERM research in different perspectives. The first part of the literature review is mainly focused on the definitions of risk and risk management, where various definitions are identified and critically analysed. Secondly, theories and authors suggestions on ERM implementation are discussed, and the most popular ERM frameworks are outlines and explained (COSO, 2004; ISO, 2009; S&P, 2008). Thirdly, the previous studies on the value of ERM and its implementation determinants are reviewed. It has been shown from this review that there is a lack of ERM studies in the non-financial sector, especially in the energy and natural resources companies. Further, the relationship between ERM implementation and firm value, especially in the energy and natural resources sector, is not yet clear, and the determinant of ERM successful implementation are not sufficiently examined. The aim of this thesis is to examine the effect of ERM on firm value in the energy and natural resources firms listed in NYSE and NASDAQ. For the knowledge of

the author, this research is one of a kind. Also, the study offers a new method for examining the current state of ERM in the firms and for identifying its implementation stage. Despite the fact that the vast majority of ERM studies relied on secondary data for recognising ERM users and non-users, many questions have been raised about the accuracy of this approach. Hence this study addressed this limitation in the ERM literature by using both primary (survey) and secondary data, which helps in proving precise results that can be generalised. To conclude, this research provides a starting point for many ERM scholars as well as several contributions to theory and policy.

Chapter Three
Research Methodology

3.1 Introduction

This chapter examines the research methodology used in this thesis. It addresses the full research plan and a detailed justification of the data collection method by utilising Saunders, Lewis and Thornhill (2018) onion presented in Figure (3.1). In coming to this central point, the researcher defines and justifies his research philosophy, research approach, methodological choice and research strategy. This chapter also provides a detailed understanding of the research population, sampling technique and the design of the survey instrument, as well as the data analysis method.

The aim and objectives of the study

Based on the critical review conducted in chapter two, the researcher identified several limitations in the ERM literature.

First previous ERM studies are mainly focused on the insurance and financial services sector; however, there is a paucity of research in the non-financial sector, especially in the energy and natural resources industry. Secondly, although there is a considerable number of studies on the relationship between ERM and firm value, researchers failed to use an accurate measure for ERM level of implementation in the firms. Many researchers relied on secondary data for finding evidence about ERM presence; however, most of their results were subject to criticism. Also, the findings of previous studies on the effect of ERM on firm value are controversial. Thirdly, the research on the determinants of effective ERM implementation is still in its infancy. Consequently, the factors associated with ERM successful implementation are still unclear, which is hindering the spread of the ERM concept.

This study aims to address these gaps in the literature by examining the effect of ERM adoption on firm value and investigating ERM implementation determinants in the North American

energy and natural resources firms. To achieve this aim, the study set out the following four objectives:

1. To measure the level of ERM implementation in the North American energy and natural resources publicly traded companies.

2. To investigate the effect of the adoption of enterprise risk management on firm value in the North American energy and natural resources publicly traded companies.

3. To examine the firms' characteristics that influence ERM implementation in the North American energy and natural resources publicly traded companies.

4. To determine the effect of the firms' risk culture on ERM implementation stage in the North American energy and natural resources publicly traded companies.

In this chapter, the researcher explains the methods he employed to address these research objectives. The researcher justifies his philosophical approach, methodological choice and select the appropriate research methods to answer the research questions (Gelo et al., 2008).
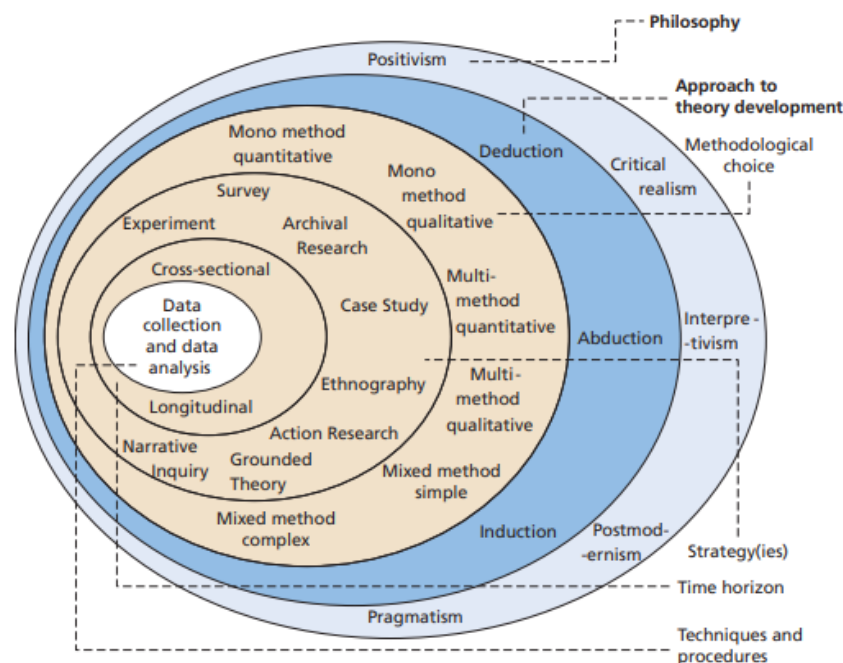
Figure 3. 1 Research onion (Saunders, Lewis and Thornhill, 2018)

3.2 Research Philosophy

Understanding the philosophy of the study is considered a central part of research planning. Hughes (2016) asks:

"What is it about philosophy that gives it this seemingly vital role in human intellectual affairs? Is this simply a contingent fact of our intellectual history, or is there something distinctive about philosophy itself which gives it this authoritative place?"

Saunders, Lewis and Thornhill (2016) answer this question in their book "research methods for business students." He stated that scholars make assumptions in every stage of their research (Saunders, 2016). These assumptions about the researchers' knowledge and the nature of realities they face during their studies have a strong influence on the researchers understanding of their research questions, research methods, data analysis and findings (Crotty, 1998). In other words, the chosen research philosophy is considered the researcher's assumption in which he/she see the world. These conjectures provide the basis of the research strategy and the research method.

3.2.1 Ontology

Ontology is mainly related to the nature of reality (Saunders, 2012; Bryman, 2011; Sekaran, 2016). In her work "What is Ontology", Guarino (2009) described ontology as a philosophical branch of knowledge that is mainly concerned with the nature and structure of reality. Aristotle tackled this concept in Metaphysics, where he identified ontology as the science of "being qua being," i.e., the study of qualities that relates to things because of their very nature (Guarino, 2009). Unlike scientific experiments, which is mainly focused on discovering and forming realities under particular rules and process, ontology is concerned about the nature and structure of things in itself regardless of any external factor.

The two leading ontological positions in business management research are objectivism and subjectivism. Both philosophies are capable of producing valid knowledge (Saunders, 2012,

2016). Objectivism considers that "things exist as meaningful entities independently of conscious and experience that they have truth residing in them as objects, and that careful research can attain the objective truth and meaning" (Crotty 1998, p 13). The objectivist paradigm in social research was adopted from natural sciences in which social scientists agreed to utilize the natural sciences approach in investigating social science phenomena (see Holden and Lynch, 2004). Hence, objectivism is frequently associated with positivism epistemology (see Figure 3.2) (see, Easterby-Smith et al., 1991; Crotty, 1998, Hughes and Sharrock; 1997; Mackenzie and Knipe, 2006).

The second ontological position is subjectivism, which considers that social phenomena are established from "the perceptions and consequent actions of affected social actors (people)" (Saunders, 2016, p 130). Ontologically, subjectivism is also known as constructivism (see Bryman, 2011; Dudovskiy, 2018), which considers that reality is constructed through social interaction. This is congruent with Vygotsky (1978) "social constructivism theory", which emphasise the role of social interaction in the process of creating knowledge

3.2.1.1 Justification of objectivist position:

This research seeks to study the effect of the adoption of Enterprise Risk Management (ERM) on firm value in the North American energy and natural resources industry. The primary variables of the research are numerical facts (reality) that are external to the principal researcher and others. Furthermore, the study sample consists of all the energy and natural resources companies listed in New York Stock Exchange (n= 392), in which it is expected that these firms follow the same corporate governance rules and regulations. Other aspects of the structure in which companies operates may vary; however, the essence of the function is very much similar in all the firms. The study employs a survey to investigate the level of ERM implementation and its determinants while the dependent variable (Tobin's Q), as well as other

financial variables, are collected from companies' databases and annual reports. The principal researcher and the participants do not have any influence on the research variable and the research results.

Objectivism

Positivism

Survey Research

Statistical Analysis
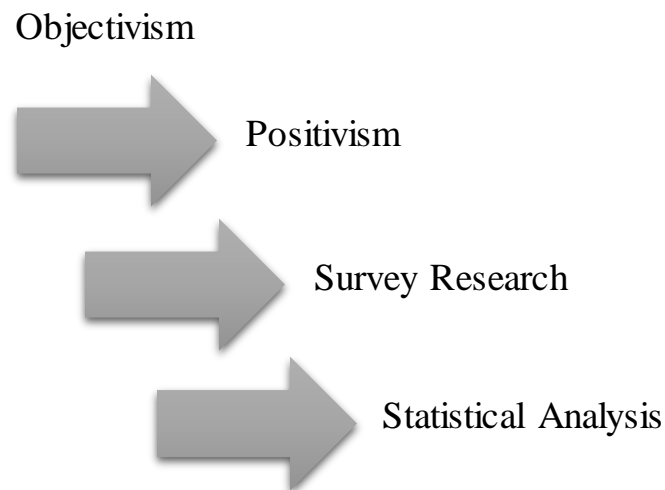
Figure 3. 1 Objectivism Ontology (Adopted from Crotty, 1998)

3.2.2 Epistemology

Building on the pioneering work of Burrell and Morgan (1979), Cohen et al. (2007) postulates that epistemology relates to the bases of knowledge, its nature and forms. He argues that epistemological assumptions are concerned with how human creates knowledge and how they attain and communicate it to other human beings. In other words, epistemology is the philosophy of knowledge or how we come to know (Trochim, 2006), and it is significantly related to both ontology and methodology. While the ontological position is concerned with the nature of reality, epistemology is mainly focused on how we come to know that reality.

Epistemology asks the following three questions: What is the relationship between the knower and what is known? (Guba and Lincon, 1994) How do we know what we know? What is considered as knowledge? What is considered legitimate knowledge? (Burrell and Morgan 1979). The wide range of disciplines in business research means that various types of knowledge, such as numerical, textual and visual data, can all be considered legitimate

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(Saunders, Lewis and Thornhill, 2016). Therefore different business and management disciplines adopt different epistemologies in their studies.

According to McEvoy and Richards (2006), the three leading epistemological positions that are frequently adopted by social science researchers are the following:

3.2.2.1 Positivism

Positivism is defined by Bryman (2011, p 15) as an "epistemological position that advocates the application of the methods of the natural sciences to the study of social reality and beyond." The positivist researcher is objectivist, where the researcher has an impartial approach toward the research (Scotland, 2012). They simply stick to what can be observed and measured. Researchers adopting this approach seek to discover absolute knowledge about objective reality, and they consider anything beyond that impossible (Trochim, 2000).

Positivist researcher does not influence the research. Meaning lies in the object being studied, and it is the objective of the researcher to find it. For that reason, it had been argued that positivist researchers attempt to obtain reliable data for explicating a social phenomenon (Ritchie et al., 2003). In most cases, positivist researchers adopt quantitative methods by using statistical data for hypothesis testing (Cherryholmes, 1992).

Most of the criticism of the positivism paradigm is that it struggles to study human beings and their behaviours deeply and thoroughly (see Crossan, 2003). For instance, in his seminal work, Ayer (1969) vigorously challenged the use of the positivism paradigm in investigating human behaviour, and he argued that it could be something about the nature of men' that makes the development of laws and the ability to generalise impracticable. Similar to Ayer (1969), several scholars agree that positivist studies produce valuable data. However, they claim that it is limited to providing a superficial view of the phenomenon it examines (Payle 1995).

Despite the amount of criticism that the positivism position received, the fact that it is highly reliable still attracts a large number of researchers. Adopter of this approach claims that they have no control or influence on the data collection process, which means that there is a very low possibility for manipulating the collected data.

3.2.2.2 Critical Realism

Critical realism is one set up of realism that differs from other positions by its view of the reality of the natural order and the incidents and discourses of the social world (Bryman, 2011). According to Bhaskar (1989), "we will only be able to understand—and so change—the social world if we identify the structures at work that generate those events and discourses . . . These structures are not spontaneously appear in the observable pattern of events; they can only be identified through the practical and theoretical work of the social sciences".

Critical realism is associated with a metaphysical realist ontology and selective realist or interpretivist epistemology (Easton, 2010). Even though it is still regarded as a new paradigm, it is being adopted by many scholars in different disciplines, including social science (see Lawson, 1997, Ackroyd & Fleetwood, 2004). One of the main characteristics of a realist researcher is that he/she agrees that the world is socially constructed; however, this is not the absolute case. Alternatively, they interpret rather than construct the world. Sayer (2000) explains that critical realism accepts that social phenomena are meaningful at their core and that meaning is not only what we see, but it is constitutive of them. Sayer argues that meaning should be comprehensive and "it cannot be measured or counted, and hence there is always an

3.2.2.3 Interpretivism

Similar to critical realism, Interpretivist advocates subjectivist ontology which contradicts with positivism perspectives (Scotland, 2012; Saunders, 2016; Grix, 2018). Unlike Positivism, Interpretivist argues that human creates meaning which makes them distinctive from physical phenomena. Thus, Interpretivists examine those meanings, and they emphasise on the crucial

need of differentiating social sciences research from natural sciences research. Since human in this world belongs to different environments, different cultures and different situations, they naturally establish different meanings and encounter diverse social realities. As a result, interpretivists argues that positivist attempts to find definite, universal 'laws' that applies to everybody is rather abstract. Further, they presume that such generalisation is superficial and does not reach the essence of human nature.

Ontologically, interpretivist researchers adopt relativism. As posted above, relativism views the nature of reality subjectively, and it emphasises that it differs from a person to another (Guba & Lincoln, 1994, p. 110). Supporters of this position believe that our sense has a strong influence on reality. In the absence of consciousness, the world has no meaning. Reality appears when consciousness interacts with objects which already stem meaning (Crotty, 1998, p. 43). Reality does not exist independently, and it is individually constructed; there are as many realities as individuals.

3.2.2.4 Justification of Positivism Position

Considering the nature of the research topic (the determinants and value of ERM adoption) and the nature of the research questions (explanatory/casual research questions), the researcher has identified positivism as the most suitable research philosophy for this particular study. Positivists' approach allows the researcher to strictly use scientific empiricist methods to produce pure data and facts that are collected from the North American energy and natural resources publicly traded companies, unaffected by human interpretation or bias. In doing so, the researcher will be able to generalise his finding on the sector and provide practical recommendations to energy and natural resources industry practitioners and risk management academics.

Moreover, the researcher's financial management background and his practical knowledge of the enterprise risk management area pull towards selecting a positivist position. The researcher aims to examine the effect of ERM on firm value and to investigate the determinants of ERM successful implementation. Unlike many scholars who used secondary data for seeking evidence on the presence of ERM in the companies (see Hoyt et al., 2011; Wu et al.,2014), this study employs a survey for finding these evidence. From a positivist stance, the researcher uses sophisticated statistical analysis models for testing the collected data. Although some researchers favoured an Interpretivist position, such as case studies and interviews in studying ERM (Mikes and Kaplan, 2014), these methodologies failed to provide realistic and technical results for stakeholders about the value of investing in ERM.

3.3 Research Approach: Deductive Vs Inductive

William Trochim (2006) made a distinction between deductive and inductive approaches which he referred to as the "two broad methods of reasoning" (Trochim, 2006, p17). He defined deduction as moving from general to specific (see Figure 3.3), while induction as starting from specific case to general. Many renowned scholars in the area support this definition (see Kovacs 2005; Saunders, 2016). Similar to Trochim (2006) definition, Creswell and Clark (2007) stated that deductive scholars "works from the 'top-down', from theory to hypotheses to data to add to or contradict the theory." In the other hand, they described the inductive research approach as a "bottom-up" and that the researcher uses the research participants' views to create broader themes and develop a theory interconnecting them (Creswell and Clark, 2007, p 73).
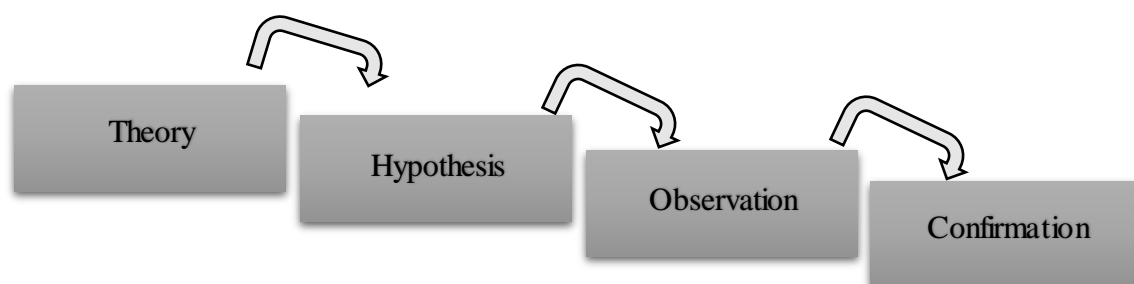
Figure 3. 2 Deductive reasoning (created by the author, 2019)

The inductive researchers often criticise the deductive research approach as it consists of a fixed methodology that does not allow a different explanation of the hypothesis. Even when alternative theories are suggested, yet they will be within limits set by the highly structured research design (see Saunders, 2016). Despite this severe criticism, yet deductive is predominant in social science research, particularly in the business discipline (see, Alvesson and Skoldberg, 1994), which is frequently associated with quantitative data analysis (see Kirkeby, 1990; Williams, 2007). This is congruent with Biber and Johnson (2015, p 42), who stated that "quantitative research is assumed to be value-neutral, deductive, and generalisable". In contrast, the inductive research approach is usually linked with qualitative research analysis and interpretive research philosophy (Biber and Johnson, 2015). A researcher who adopt deductive research usually tends to test theories quantitatively, seeking evidence for either supporting or rejecting the hypothesis. In contrast, advocates of inductive research start by collecting qualitative data from participants to which allow them to spot themes for theory development (Creswell and Clark, 2007).

3.3.1 Abductive Research Approach

Many scholars still designate quantitative studies as deductive and qualitative researches as strictly inductive; however, these assumptions are often incorrect (Suddaby, 2006). In his seminal work, Peirce (1992) found that studies that are purely deductive or purely inductive are incapable of producing new ideas. He postulates that novel ideas can only be established through the integration of both approaches, which he named "abduction." Abduction is defined as "the process of forming an explanatory hypothesis. It is the only logical operation which introduces any new idea" (Peirce, 1992, p 216). The abductive theory has become associated with grounded theory as "analytic induction." In this method, the researcher combines both induction and deduction while "moving back and forth" (Suddaby, 2006). Abductive research starts with the examination of surprising facts; it then seeks a reasonable notion of how things

could have happened (Saunders, Lewis and Thornhill, 2016). Van Maanen et al. (2007) suggested that some feasible theories can contribute to the study better than others in which they could assist in discovering more 'surprising facts'. Besides, it has been proposed that both deduction and induction supplement abductive reasoning as an approach for examining reasonable theories (Van Maanen et al., 2007). It is commonly argued that researchers who conduct case study research are advocates of abductive reasoning (Alvesson and Skoldberg, 1994; Dubois and Gadde, 2002; Wigblad, 2003). This happens because of the synchronous collection of data as well as theories formation (Dubois and Gadde, 2002).

3.3.2 Justification of Deductive Research Approach

The adoption of the deductive research approach is crucial to understanding the effect of ERM on firm value and identifying the determinants of its implementation in the North American energy and natural resources firms. From a deductive point of view, the study's conceptual framework has been derived based on several theoretical assumptions investigated in the literature reviewed in Chapter 2 (mainly the value maximisation theory, the portfolio theory and the agency theory). In other words, the conceptual framework has been deduced from the theories and literature.

First, the researcher starts by critically reviewing the ERM literature, which helped identify the main theories in the field and the gap in ERM knowledge. A theoretical framework followed the critical review. After conducting a theoretical framework, the researcher developed the hypothesis of the study. Next, the researcher collected the research data from primary and secondary sources. These data were later analysed using quantitative analysis techniques. Thus, the research began by studying the broad concept of ERM (general) and drastically narrowed down to focus on its effect on firm value and its implementation determinants, particularly in the energy and natural resources sector (very specific). Further, the researcher divided this study into depended variables, independent variables and control variables.

3.4 Methodological Choice: Quantitative Vs Qualitative

Neuman (2006) claims that the most common methodological choices in research are quantitative and qualitative research. Although Bryman (2001) stated that the distinction between both methodologies "is really a technical matter whereby the choice between them is to do with their suitability in answering particular research questions", yet adopting a suitable research method is still considered one of the main challenges for researchers. Generally, the quantitative method is commonly associated with positivist paradigm and deductive approach (Crotty, 1998), while the qualitative research approach is mostly linked with interpretivist and inductive approach (Crotty, 1998). Scholars who work from a positivist perspective mainly focus on the interactions between variables, shaping events and relationships (Scotland, 2012). These researchers usually develop and examine this interaction using numerical studies. Several experiments such as Multivariate analysis, linear regression models and other techniques for statistical analysis are the most widely used in this type of studies (see Saunders, 2016). Advocates of quantitative research (positivist paradigm) believe that producing a real knowledge can be achieved only through direct observation (Lincoln et al., 2005) or manipulation of research variables (Trochim, 2000) as well as using statistical analysis techniques (see Bryman, 1998).

Given that quantitative methodology is mainly concerned with examining relationships and identifying causes and outcomes (Creswell, 2009), its purpose is to generate laws and generalise results. In doing so, correlation analysis is implemented in order to decrease complicated interactions. Other evidence is investigated through empirical testing, research variables (independent, dependent and moderator) and control variables.

In the other hand, qualitative methodology is associated with interpretivist epistemology and subjectivist ontology (Antwi and Hamza, 2015). Merraim (1998) postulates that meaning in qualitative research design is often established from the participants of the study and that the

researcher's own beliefs influence it. Scholars conducting qualitative studies attempt to engage in a specific culture by monitoring its participants and their communication, usually through arranging exercise, interviewing main people, studying histories and designing case studies (See for example, Brannan and Oultram, 2012; Plankey-Videla, 2012). The researcher conducting qualitative research aims to enter the social world of the study participants (Saunders, 2016).

In addition, "qualitative research is characterized by its aims, which relates to understanding some aspect of social life and its methods which (in general) generate words, rather than numbers, as data for analysis" (McCusker and Gunaydin, 2019, pp 1). For scholars who favour quantitative methods, which is mainly concerned with measuring something (for instance, the percentage of children with Dyslexia in society) they consider using a qualitative research method imprecise. The purpose of qualitative research is to obtain a deep understanding of a particular organisation or phenomenon, instead of a deriving surface description of a large sample of a population (see Germain, 2001). "It aims to provide an explicit rendering of the structure, order, and broad patterns found among a group of participants" (Germain, 2001). This methodological choice aims to answer questions such as 'what', 'how' or 'why' of an event instead of 'how many' or 'how much', that is solved by quantitative research methods (McCusker and Gunaydin, 2014). In case the objective is to grasp how a society or people within it consider a specific issue, the qualitative methods are the most suitable (Baruch, 1999). Because the qualitative method is often associated with subjectivism (Saunders, 2012, 2016) (see also the seminal work of Smircich and Gareth, 1980), the researcher's integrity and personality may have a higher impact compared to quantitative research. Consequently, the quality of the data collection process is crucial for the qualitative researcher because he/she will need to interpret and analyse data after obtaining it; however in quantitative studies, the

raw data are more substantial. If the researcher fails to collect a high quality of data, all statistical calculations will be affected, which may reflect a different view than reality.

Table 3. 1 Characteristics of both Quantitative and Qualitative Paradigms

Characteristics	Qualitative approach	Quantitative approach
Objective	Concerned with understanding participants' behaviour from the frame of reference	Seeks the facts or causes of social phenomena, without advocating subjective interpretation.
Approach	Phenomenological approach	The logical, scientific approach
Measurement	Uncontrolled, observational data	Obtrusive, controlled measurement
Researcher position	Subjective, insider's perspective, close to the data includes the points of view of participants	Objective, outsider's perspective, distanced from the data, includes points of view of the researcher
Method	Inductive, exploratory, expansionist, descriptive, discovery orientated, structured, generation of theory	Deductive, ungrounded, verification oriented, confirmatory, reductionist, confirmatory, reductionist, Inferential, unstructured, Inferential, unstructured natural science model
Epistemological	Subjectivist	Positivist
Orientation	Process-oriented	Outcome-oriented
Evaluation	Validity is critical: rich, real and deep data	Reliability is critical: real, hard and replicable data.
Scope	Holistic: attempts to synthesise	Particularistic: attempts to analyse
Assumption	Assumes a dynamic reality	Assumes a stable reality

Source: Adapted from Salazar (2010), Cook and Reichardt (1979), Bryman (2012) and Cook and Reichardt (1979)

3.4.1 Multi-Methods and Mixed-Methods Research

Over the past few decades, researchers have shown an increased interest in mixed methodology. Scholars in different fields of social science and particularly in business studies have started using mixed methods excessively in their researches. In 2009 Bryman and Cramer investigated several studies that adopted mixed methodology. His research focused on the period between 1994 and 2003, where he found a tremendous increase in using mix methods

in this period. Similar to Bryman and Cramer (2009), Hanson and Grimmer (2005) examined a large number of research articles in three renowned marketing journals on the period between 1993 and 2002, where they found that 14% of the articles are based on mixed methodology. Comparable results had been discovered in international business journals, where they identified that 17% of the research articles are conducted using mixed methods (see Hummerinta-Peltomäki and Nummela, 2006).

Unlike quantitative research, which mainly focuses on numeric data analysis and qualitative research, which focus on narrative data, mixed methods combine the two types. Tashakkori & Teddlie (2003a, p. 711) defined mixed methods as "a type of research design in which QUAL (Qualitative) and QUAN (Quantitative) approaches are used in types of questions, research methods, data collection and analysis procedures, and/or inferences". Another definition was established later in the *Journal of Mixed Methods Research*, where mixed methods is defined as "research in which the investigator collects and analyses data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or program of inquiry" (Tashakkori & Creswell, 2007b, p. 4).

Mixed methods researches combine quantitative and qualitative techniques in several ways, such as concurrent forms to more complex and sequential forms (Saunders, 2016). Given that this variety in combining quantitative and qualitative techniques helped many researchers in identifying different types of mixed methods research (Creswell and Clark 2011; Nastasi et al. 2010), this study will mainly focus on Morse (1991) triangulation and particularly on sequential triangulation Quan → Quan.

In his landmark work, Morse (1991) defined methodological triangulation as:

"The use of two methods usually qualitative and quantitative, to address the same research problem. When a single research method is inadequate, triangulation is used to ensure that the most comprehensive approach is taken to solve a research problem".

According to Morse (1991), Methodological triangulation is divided into two main categories: simultaneous and sequential (see table 13 above). "Simultaneous triangulation is the use of qualitative and quantitative methods at the same time" (Morse, 1991, p 120). Some scholars have different terminology regarding simultaneous triangulation than that of Morse (1991). For example, Creswell and Clark (2007) defined it as "*concurrent*" designs, while Teddlie and Tashakkori (2009) entitled it "*parallel* designs". Using the terms "*simultaneous* and *concurrent*" means that the qualitative and quantitative phases of research happening at the same time (Teddlie and Tashakkori, 2009). In this approach, the methods have a confined interaction during the data collection stage. However, the results complemented each other's (Morse, 1991).

In the other hand, sequential triangulation is adopted "if the result of one method is essential for planning the next method" (Morse, 1991). In this approach, Quan is collected before Qual or vice versa. This design is standard in researches, where one phase is conducted after the other (QUAL → QUAN or QUAN → QUAL). The results of the first phase help in the formation of the following phase. The conclusion of the whole study is based on the integration of the finding of both phases. Usually, the second phase of the research is conducted to support further or elaborate the results of the previous phase (see, Tashakkori & Teddlie, 2003).

3.4.2 Quantitative Multi-Methods: QUAN → QUAN

In Quantitative research design, research commonly uses one data collection technique, e.g. a survey, and related quantitative analytical methods. This process is named the mono method of a quantitative study (Saunders, Lewis and Thornhill, 2018). A quantitative study may also use more than one method for data collection. Studies that adopt this mechanism are identified as quantitative multi-method (Saunders, Lewis and Thornhill, 2018) (see Figure 3.1 Saunders' onion, page 96). For instance, a researcher may wish to collect quantitative data using an online survey followed by a structured observation and then analyse these data using statistical

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software. Multi-method research is a branch of mixed methodology (MM). However, a multi-method design differs by using two similar data collection methods (e.g. Quan and Quan or Qual and Qual). According to the Morse (1991) notation system, the simultaneous one-method research is expressed as QUAN + QUAN or as QUAL + QUAL while a sequential one-method study is notated QUAN → QUAN or as QUAL → QUAL.

In this study, a quantitative sequential multi-method is adopted (Quan →Quan) to answer the research questions. The first phase of data collection uses a survey tool that will mainly address the first research question about ERM current state in the North American energy and natural resources sector. The survey study results are crucial for answering the following three research questions and planning the second phase of the research. In phase two, which consists of collecting secondary data from the companies' annual reports, the researcher will collect data only from the companies that participated in the survey. The secondary data include Tobin's Q ratio, firm size (total assets), leverage, sales growth, institutional ownership, dividends payables and return on assets (ROA). Finally both the data collected using the survey tool (ERM stage, the board of directors monitoring, CRO, big four audit firms and risk culture) will be entered to SPPS and computed using several statistical models to examine the determinants and value of ERM. Recently, Lechner and Gatzert (2018) used a similar method to examine the determinants and value of enterprise risk management in Germany; however, their study is limited to using only secondary data.

3.4.3 Justification of QUAN → QUAN Research Design

The quantitative method is the most predominants research design in enterprise risk management literature, especially in studying its determinants and its effect on firm value. However, as discussed in chapter two, most of these studies have mainly relied on secondary data for answering their research questions (see Liebenberg and Hoyt, 2003; Hoyt and Liebenberg, 2008, Gordon et al., 2009; Pagach and Warr, 2010; Hoyt and Liebenberg, 2011;

McShane et al., 2011; Pagach and Warr, 2011; Razali et al., 2011; Tahir and Razali, 2011; Golshan and Rasid, 2012). Few others conducted a survey study only (see Beasley et al., 2010; Daud et al., 2011; Yazid et al., 2011; Grace et al., 2015). Nevertheless, many of these studies had been subject to criticism due to the inaccuracy and controversy of results.

Knowing that identifying the ERM implementation stage is crucial for studying its effect on firm value, four different methods have been identified in the literature to measure it. The first method, which has been prevalent in several studies, focused on searching databases for the hiring announcements of Chief Risk Officer (CRO) as evidence for ERM presence (see Liebenberg and Hoyt, 2003; Beasley et al., 2008; Pagach and Warr, 2008; and Pagach and Warr, 2011). However, relying on the presence of CRO in a company has been considered "insufficient evidence" of ERM adoption by many scholars (Sekerci and Pagach, 2019) because many firms hire CRO without having ERM programme.

The second method which has been extensively used for identifying ERM adoption is to search for a keyword in companies' databases, press releases and annual reports. Researchers used several databases such as Down-Jones, Compustat and Lexis Nexis by entering keywords, like "CRO", "ERM", "enterprise risk management (Hoyt and Liebenberg, 2011; Tahir and Razali, 2011; Eckles et al., 2014; Beasley et al., 2008; Liebenberg and Hoyt, 2003; Pagach and Warr, 2010). Although more than 35% of the researchers in ERM used this method (see Kraus and Lehner, 2012), this method suffers from severe limitations. For example, many companies do not disclose their risk management activities and the type of risk management programme they are using.

Another option for identifying ERM practice is to use Standards & Poor's ratings. S&P's ratings were used as a proxy for ERM adoption stage by many scholars (see Baxter et al., 2013; and McShane et al., 2011; Pooser and Peter, 2012). This method's weakness is that S&P's

ratings are available mainly for firms that belong to the financial services industry. In other words, this method will limit ERM research on studying the financial sector only.

The fourth method identified in the body of literature on ERM is using a survey to collect information about ERM implementation stage directly from the firms. This method has been used in the influential work of Beasley et al. (2005) who sent their online survey for a list of companies asking them to score the level of their ERM adoption from 1 to 5. The main strength of using a survey technique is getting accurate and thorough information about a company compared to secondary data. However, sending a survey for managers asking them to score their ERM programmes may lead to unreliable results because managers could deliberately exaggerate the level of the ERM programs that they are overseeing (Sekerci and Pagach, 2019). Unlike other studies, this research uses both primary and secondary data to answer the research questions. In the first quantitative phase, an online survey was used to collect data from the companies about the current state of ERM programme and other activities that influence its implementation and success. This phase addresses the study's first research question (see page 9 for the study's research questions). The survey data are analysed using descriptive statistics, and the results are reported in chapter four.

Next, to plan the second phase of the study, which answers the explanatory research questions two, three and four (see page 9 for the study's research questions), the researcher collects secondary data from the companies that participated in the first phase (Morse, 1991). The data collected in this phase consists of firm value proxy (Tobin's Q ratio) and other predictor variables such as dividends, firm size (total assets), leverage, sales growth, institutional ownership and return on assets. These data were collected from annual reports and companies databases. Finally, the financial data (secondary data) will be coded and entered with some of the survey data (ERM stage, the board of directors monitoring, CRO, risk culture, and big four audit firms) into IBM SPSS 24 for analysis.

Using this methodological choice in ERM had started to evolve recently (see Alawattegama, 2018 and Sithipolvanichgul, 2016, Gatzert and Lechner, 2018); nevertheless, the researchers failed to identify their research design as quantitative multi-method. One of the main benefits of using this research design, especially in studying the relationship between ERM and firm value is that it increases the research reliability and validity in the area. Further using this method, makes a valuable contribution for practitioners and academics in the field.

3.5 Research Method

Led by the positivist paradigm and deductive research approach, this study will use a quantitative multi-method to address the research questions. Since many companies do not disclose their ERM activities, an online survey will be used to collect this information. All other variables will be collected from secondary databases and annual reports. An online survey tool is used for two main reasons. The first reason is to ensure that the survey reaches a more significant number of participants in a shorter period, and secondly, to ensure that specific people in the firms fill the questionnaire. Although the preferred respondents are senior managers overseeing ERM programme, in some cases where the contact details of people holding these positions are not available, the online survey was sent to companies' on the emails listed on their "Contact Us" page on their corporate websites. The emails were followed up with a phone call to ensure that the survey reached the right person. The analysis of both primary and secondary data is conducted using numerical statistical methods on IBM SPSS to achieve the research results and generalise the findings. Generally, the research method in this study is as follow:

1. The first part of this study focuses on gathering the ERM components and research variables from the literature and theory. This is done by reviewing ERM frameworks, definitions, and guidelines and reviewing other renowned scholars' work in the area.

2. For answering the explanatory research questions of this study, ERM activities should be first identified. Given that there is a paucity of information about ERM practices in the firm, the first phase of the study uses the online survey tool "Survey Monkey," which has been sent to all the energy and natural resources firms listed in New York Stock Exchanges and NASDAQ. The pilot test is used, and other statistical analysis tools such as validity and reliability test of the data. Also, the responses of the survey are analysed and interpreted (Chapter 5).

3. After completing phase one and reporting the survey results in chapter four, the second phase of the data collection was launched. The second phase consists of collecting the secondary data, which includes the financial and accounting ratios such as firm size, leverage, ROA, Tobin's Q, etc. These data are collected from financial databases and companies' annual reports.

4. Finally, the data from the survey and secondary sources are coded and entered into IBM SPSS for analysis. Two regression models were computed, the stepwise-regression model for examining the effect of ERM on firm value and the ordinal logistic regression for investigating ERM determinants.

3.6 Research Setting

3.6.1 Rationale for Studying ERM in North America

One decade has passed since the great financial crisis that had shocked the world economy and led to the collapse of many firms worldwide. After the crisis, there has been a noticeable rebound in the economy, especially in the US, which has seen the longest expansion in history (Blakeley et al., 2019). Nevertheless, economic distress emerged again in different shapes, such as the current global debt crisis, trade wars between big countries, the economic downturn in China and the COVID19 great lockdown.

In a recent report by the United Nations, Department of Economics and Social Affairs (2019, p 26), they stated that:

"Short-term risks are rising, with the potential to severely disrupt economic activity and inflict significant damage on longer-term development prospects. These include escalating trade disputes, financial stress and volatility, and an undercurrent of geopolitical tensions."

Due to these factors, organisations in different sectors are working on enhancing their ERM programmes. Many firms already started assessing the strength of their ERM facing this fast-changing economic environment. Unfortunately, most of these firms began monitoring their risk management activities after being affected by severe risks and when uncertainties became clear. "Despite seismic shifts in the environment and a critical need for risk agility, the evolution of ERM is slow" (KPMG, 2019, p 2). In response to these factors, considerable literature has grown up around the theme of ERM and mainly on its effect on firm value. However, by reviewing the literature, it is noticeable that many scholars focused their studies merely on banking and insurance companies (see Hoyt and Khang, 2000; Kleffner and Lee, 2003; Acharyya, 2008; Hoyt and Liebenberg, 2008; Pagach and Warr, 2010; Alawattegama, 2018; Chuang et al., 2019; Silva, 2019) ignoring others sectors that are considered highly exposed to risks such as the energy and resources firms.

From oil refineries to coal mines and nuclear power plants to wind farms, the energy and natural resources industry is highly vulnerable. This is because this industry crosses the international markets, spanning the global economies and various regions all over the world, which make it highly exposed to a wide range of risks. Thus, a considerable number of energy and natural resources companies started building a strong immunity against these emerging risks by transforming their traditional risk management strategies into a holistic risk management programme. In order to understand the current situation of ERM in the energy and natural resources firms, this study examines a sample from this sector in North American.

The primary rationale for selecting this sample is the increasing decline of investment in the energy and natural resources stocks since 2011 (Bloomberg, 2019; FT, 2020), especially in the US. This research is highly significant for reassuring investors' confidence in the energy and natural resources firms in the US by proving that they are maintaining a robust ERM programme that can protect them from any emerging risks. In doing so, investments may increase, which will help these firms achieve their strategic objectives and create shareholders value.

Two other reasons had been taken into consideration for choosing the North American region for this study. Firstly, this market is highly exposed to many risks, which made it very attractive for many scholars in the area (McShane, 2011; Liebenberg and Hoyt, 2011; Desender, 2011; Nair et al., 2014; Grace et al., 2015; Walker, 2015; Ai et al., 2016). Secondly, after studying several stock markets in different countries, it has been evident that the biggest number of listed energy and natural resources firms are available in the New York Stock Exchange and NASDAQ. Choosing this region for this study helps increase the sample size, which has been the main limitation in many renowned ERM studies (see Beasley et al., 2005, Liebenberg and Hoyt, 2003). Further, a larger sample size helps enhance the accuracy of the statistical analysis and generalise the results on the sector.

Even though studying ERM in the energy and natural resources sector would provide a significant contribution for both ERM literature and policy, for the knowledge of the author, the only study that had been conducted on this sector is that of Walker's (2015). However, his work was subject to some limitations. Therefore, this thesis aims to address these gaps in the literature.

3.7 Target Population

This study has adopted a quantitative multi-methods design for answering the research questions. The first phase is an online survey questionnaire sent to a sample of North American

energy and natural resources firms listed in NYSE and NASDAQ. The second phase of the research is collecting secondary data (such as Tobin's Q and ROA) which has been collected from Y-Charts database and annual reports. The data are collected for the year 2018-2019 to explore companies ERM activities and whether the adoption of ERM programme is affecting their value creation. Using a one year worth of data in ERM research is commonly accepted by many scholars who contributed to ERM literature (Tahir and Razali, 2011).

Given that targeting the whole population of a specific sector in a particular region is a common practice in ERM studies, the target population of this research is all the energy and natural resources firms listed in New York Stock Exchange and NASDAQ. The total number of firms is 392. Table 3.2 classifies the firms of the study sample by their industry.

Table 3. 2 The Energy and Natural Resources Sector by Industry Group

Industry Group	Number of firms
Coal mining	23
Gold mining	17
Electric energy	24
Water supply	21
Integrated oil companies	19
Metal fabrication	8
Natural Gas Distribution	29
Oil and Gas Production	169
Oil Refining / Marketing	29
Oil field service equipment	22
Chemicals	31
The total population of companies	**392**

Source (New York Stock Exchange, 2019; NASDAQ, 2019; Y-Charts s, 2018)

Few ERM studies did not focus on a specific industry sector (see Muthuveloo and Ping, 2015; Sithipolvanichgul, 2016; Gatzert and Lechner, 2018; Pagach and Sekerci, 2019). For example,

Gatzert and Lechner (2018) used a sample of 160 listed German companies that belong to different industries in order to study the determinants and value of enterprise risk management. In the same vein, Muthuveloo and Ping (2015) targeted the whole population of firms listed in Bursa Stock Exchange (n= 800) to examine the impact of ERM on firm performance; however, their research was limited for a low response rate (13%). Callahan and Soileau (2017) examined whether ERM enhances the operational performance of the firms by focusing their study on a sample of 1631 firms in the US and other countries. Nevertheless, their study had the same limitation as that of Mathuveloo and Ping (2015) in which they received only 169 responses from their entire sample (10.36 % response rate).

On the other hand, the majority of ERM study that focused on a specific sector selected the insurance and financial services companies in their samples (see Hoyt and Khang, 2000; Kleffner and Lee, 2003; Hoyt and Liebenberg, 2008; Acharyya, 2008; Pagach and Warr, 2010; Alawattegama, 2018; Chen et al., 2019; Silva, 2019). For instance, using the same method of Hoyt and Liebenberg (2011) to examine the effect of ERM on firm value, Chen et al. (2019) collected data from a sample of 68 Taiwanese financial companies listed in Taiwan Stock Exchange (TWSE). Similarly, Li et al. (2013), targeted the entire population of insurance companies in China which consists of 135 firms.

This general lack of ERM studies in the energy and natural resources firms may lead to slow development of the programme in this sector. This raises the necessity of finding empirical evidence on ERM and firm value in these firms. This study is expected to have a crucial contribution to knowledge and managerial implication in the field.

3.8 Target Respondents

As this research aims to examine the effect of ERM implementation on firm value, it is crucial to identify the current state of ERM in the North American energy and natural resources firms.

In order to collect accurate data, the survey should be sent to the person responsible for the risk management programme in the firm or at least involved in senior risk management activities.

In 2012 the Institute of Internal Auditors in North America (IIA) and the Risk and Insurance Management Society (RIMS) had a conference to discuss the advantages of their collaboration. During the conference, the IIA Vice President said: "In the end, risk managers and internal auditors have many of the same stakeholders — boards and executive management — and these stakeholders want to maximize resources while effectively managing risk" (IIA, 2012, p 1). This a clear hint that the person responsible for overseeing ERM is often a senior executive at C-suite level. Similarly, in his landmark work, Simkins and Ramirez (2008, p 586) stated that "ERM programs can help organisations succeed and prosper if they are properly implemented and monitored by chief officers and the board of directors."

In the second edition of the energy & resources enterprise risk management benchmark survey, Deloitte (2014) found that CEOs (21%), CFOs (30%) and CRO (24%) are mainly responsible for overseeing the ERM programme in the firms. This may clarify why managing risks holistically is one of the main concerns within the finance procedures; it also explains the dramatic increase of ERM activities in the strategic process. In addition to the CEOs, CROs, and CFOs primary role in managing ERM, 4% of the respondents indicated that ERM responsibility is assigned to their firms' Chief Operating Officer (COO) and 21% others stated that it falls under the responsibility of other members of the Management Committee. Evidence from the body of literature supports these views; for instance, in his seminal work, Beasley et al. (2005) conduct a study to examine the main factors associated with the implementation extent of ERM programme. Based on the survey data they gathered from a variety of US and international organisations, they found a positive relationship between CRO presence and ERM stage. They also found that CEO, CFO, the board of directors and the presence of the big four auditors supports ERM implementation.

Therefore the online survey of this study mainly targets the CEOs, CROs, and the CFOs of the North American energy and natural resources companies. Other firm members such as risk managers, finance manager or any senior risk management position are also welcome to participate in the survey.

3.9 Data Collection Approach

3.9.1 ERM Survey Tool

The electronic web questionnaire has seen a growing interest among researchers in the US and many other countries in different regions (Christian, Smyth and Dillman, 2014). This increasing trend is due to several factors such as its low fairy cost and its capacity for gathering a large number of responses from a large sample in a short period (See Couper, 2001). Given that this research targets all the energy and natural resources firms listed in NYSE and Nasdaq (n= 392), online survey instruments have been employed to collect data about the current state of ERM in these firms. The survey was launched after receiving the evaluation from the participants in the pilot test. Despite the increasing trend of using the online survey tool in quantitative studies nevertheless, using it for data collection has both advantages and disadvantages. For instance, Cooper (2000) postulates that collecting research data using an online survey questionnaire is more efficient compared to other tools. Cooper (2001) suggested that the online survey benefits the researcher in different perspectives such as its low price, simplicity and speed. Moreover, the design process of an online survey questionnaire is convenient, and it helps in increasing response rate by providing more accessibility to a larger number of participants using different methods such as posting the survey links on professional social networking websites (see Schindler and Cooper, 2014).

Although using an online survey has a considerable number of advantages, yet it is subject to several limitations. For example, Schindler and Cooper (2014) argue that using an online survey tool may create anxiety among some participants that could be due to confidentiality

factors and other concern on whether their responses will be securely maintained. In other words, some of the participants might think that their responses on the ERM practices within their firms could be shared with other firms, breached for public or used for other purposes. To reduce the influence of these limitations, a letter had been attached on the first page of the survey clearly explaining the purpose of the study and its abidance with the ethical code of the University of Wales Trinity Saint David. Also, the letter assured the participant that their inputs would be treated confidentially. The participants' responses will not be available for third party use, and each participant has the option not to disclose his/her name and the company they work for.

Knowing that the research sample is derived from North American public listed companies, the contact details of the research participants had been collected from public sources such as company's databases, corporate websites, and other professional social networking websites. The professional networking website-LinkedIn had also been utilised for searching for participants in specific industry sectors, regions and specific roles in the firms. LinkedIn also helped in viewing the competencies and experiences of the participants. In some cases, when the contact details of some companies were not available, the online survey was sent to the companies' email addresses available on the "contact us link" on their website. The attached letter asked the companies to transfer the survey to a senior executive (CEO, CRO, CFO) or for someone responsible for risk management in their firm. A follow-up phone call had been made afterwards to ensure that the right person had received the survey. In addition, a survey question on the participants' position/title was included in the demographic section of the survey.

For increasing the response rate of the study, several methods had been used. First, a link to the online survey had been posted on LinkedIn membership groups such as the Institute of Risk Management (IRM), Enterprise Risk Management Canada, Energy and Natural Resources

Sector Professionals and LinkedIn Energy. Secondly, the premium membership on Survey Monkey provides an option to target specific individuals with specific roles in a specific sector and a specific location. This membership has been used for two month only due to the high cost of the service. Thirdly an automated follow-up email had been sent to the firms after two weeks of launching the survey in case they did not respond.

The data collection process took approximately five to six month. In total, 137 survey responses have been received from a total of 392 companies. This represents a response rate of 34.95%. Despite the low response rate of this study, it is still higher than a considerable number of ERM research studies. For instance, the response rates for the studies conducted by Beasley et al., (2005), Lundqvist (2014) and Gates et al. (2012) were 10.3%, 22.6% and 27%, respectively. These results are congruent with Saunders (2016) study on the response rate of web-surveys in business research, which revealed a response rate as low as 10–20 per cent. Therefore the response rate of this study is deemed reasonable.

In order to understand the ERM practices in the North American energy and natural resources firms, the initial aim was to analyse all the 137 responses. However, 12 of the survey responses were incomplete, and some financial data of six other companies were not disclosed for the year 2018 (mainly Tobin's Q). Therefore the final number of responses that have been examined in this study were 119 companies.

3.9.2 ERM Survey Design and Pilot Study

The main purpose of using a web-based questionnaire in this study is to collect data about the current stage of ERM in the North American energy and natural resources sector. This study adopts Beasley et al. (2005) ordinal scale to measure ERM stage, which will be explained in the following section. Other variables, such as the determinants of ERM implementations, were also collected using the survey instrument. This survey not only contribute to ERM literature but also it gives an aggregate picture of ERM in the industry, which provides a

significant contribution to practitioners, investors and researchers in the energy and natural resources sector.

The questionnaire is divided into four categories. The first part covers the demographic questions of the participants. The second part covers the ERM index and other key information about the state of ERM in the companies. The third part is mainly focused on ERM implementation determinants, and the last part examines risk culture in the participants' organisations. Some question has been included in the survey are based on relevant academic literature, and it has been mainly used to gain an informative insight into the companies risk management practices and procedures. Therefore some question were not included in the data analysis and the regression equations of the research.

Most of the survey questions are closed-ended, with only a few open-ended questions across all the survey parts. In order to minimise the burden to participants, the survey was designed in a clear format and a simple structure in which it would not require more than 10 minutes to be completed. The expected completion time of the survey is between 8 to 10 minutes.

After designing the survey questionnaire, it has been pre-tested by a group of professionals in the field. Survey pre-testing is a crucial step in the survey design, in which it helps in assuring the quality of the survey questions in terms of wording comprehensiveness, scaling, relevancy and length (Dillman, 2011). In other words, pre-testing is a critical evaluation of the survey questionnaire, which assists in identifying whether the survey tool will operate efficiently in accordance with the validity and reliability standards of social science tools (Converse and Presser, 1986). The pre-testing sample in this study consists of both academics (3) and industry professionals (5). All ten participants provided valuable feedback on the structure and the relevancy of the survey questions.

In order to ensure the reliability and validity of the survey instrument, a Pilot test has also been conducted. According to Saunders (2016), researchers who employ a survey tool for their data

collection should run a pilot test on a sample of participants similar to that of his/her research. "The purpose of the pilot test is to refine the questionnaire so that respondents will have no problems in answering the questions and there will be no problems in recording the data" (Saunders, 2016, p 473). In addition, it will help that researcher to examine the questions' validity and the likely reliability of the data that will be collected from different types of questions (Saunders, 2016). The results of the pilot test are presented in Table 3 in Appendix C.

The Pilot study samples in this research consist of 11 participants. According to Isaac and Michael (1995), a sample of 10 – 30 participants is considered reasonable for piloting. This is congruent wit Hill (1998) and Julious (2005). Other researchers suggested 12 participants (Van Belle, 2002), and a few others postulated that it should be 10% of the study sample size (Treece and Treece, 1982). Therefore the pilot study sample for this research is acceptable.

The participants in the pilots were five risk managers, two risk management committee members, one CEO, one CFO and one Managing Director. In order to assess the validity of the survey question, Bell and Waters (2014) piloting question had been adopted. The following question had been attached to the online survey and sent to the pilot study participants:

- "How long the questionnaire took to complete;

- The clarity of instructions;

- Which, if any, questions were unclear or ambiguous;

- Which, if any, questions the respondent felt uneasy about answering;

- Whether in their opinion there were any major topic omissions;

- Whether the layout was clear and attractive;

- Any other comments" (Bell and Waters,2014)

The respondents provided additional feedback and suggestions about the survey questions (see table 3.3). Some participants suggested changing or deleting specific questions, and a few

others proposed adding a new question that had not been included in the initial survey design. After reviewing and implementing the Pilot test feedback, the final survey was designed and sent to all the research sample (see Appendix A, Enterprise Risk Management Survey).

3.10 ERM Survey Questions Design and Layout

The final version of the survey consisted of 21 questions divided into its four categories, including the demographic section (See Appendix A). Table 3.4 shows how each section of the survey was linked to the research question. Each section is explained below:

Table 3. 4 Survey Structure

Section Description	Subjects Covered	No of Questions	Research Question
Section 1: Respondents Background Demographic information about the respondents and their firms	Descriptive variables	7	NA
Section 2: ERM Index ERM state in the energy and natural resources firms	The current state of ERM ERM implementation stage Risk Committee	5	1. What is the current stage of ERM implementation in the North American energy and natural resources sector? 2. Does the implementation of ERM in the energy and natural resources firms affect their firm value positively?
Section 3: Determinants of ERM The firm characteristic that influences the implementation of ERM	The presence of CRO Board of Directors and ERM stage Big four auditing firms and ERM stage	5	3. What are the firm's characteristics associated with a successful ERM implementation in the North American energy and natural resources sector?

Table 3. 4 Survey Structure (Continued)

Section Description	Subjects Covered	No of Questions	Research Question
Section 4: Risk Culture The influence of risk culture on ERM implementation	Firm Culture and ERM effectiveness Firm Culture and ERM Implementation ERM training for employee	4	4. Does the organisations' risk culture significantly influence the level of ERM deployment in the firms?

3.10.1 Section One: Demographic Questions

The Demographic questions in this research have been used to gain information on the
respondent's background. The background questions in this study covered the respondent's
age, the highest level of education held, work experience in the company, the annual
company revenue, the company industry and the respondent's position. Table 3.5 included
the demographic questions of the study.

Table 3. 5 Respondents Background

Survey Section	NO.	Question
	1	Name of your company
	2	Age
	3	Highest level of education held
Respondents Background	4	How long have you worked at the company?
	5	Indicate the annual revenue of your company in US dollars ($)?
	6	Indicate your company primary industry?
	7	What is your position in the company?

3.10.2 Section Two: ERM Index

According to S&P's (2005) in order to consider that a firm has an Enterprise Risk Management

programme in place, there should be clear evidence in action. Hence, one of the main

challenges for ERM researchers is to identify firms that implemented the programme. A considerable number of authors relied on secondary data such as scanning companies annual reports, press released and companies databases in order to find information about the current state of ERM in the firms (see Beasley et al., 2008; Liebenberg and Hoyt, 2003; Pagach and Warr, 2010; Hoyt and Liebenberg, 2011; Tahir and Razali, 2011; Eckles et al., 2014). Another group of scholars used S&P's ratings as an ERM indicator (see McShane, 2013; Baxter, 2011) and some others chose to develop their index using COSO Framework (e.g. Gordon et al., 2009; Grace et al., 2015; Quon et al., 2012; Ping and Muthuveloo, 2015; Panicker, 2016; Sithipolvanichgul, 2016). In this study, a survey tool was employed to collect ERM data as well as some other research variables. In doing so, the ordinal scales of Beasley et al. (2005) has been adopted for examining ERM stage in the firms. This section of the survey aims to answer the two main questions of this study (see table 3.6).

Table 3. 6 ERM Stage Question

Survey Section	NO.	Question	Reference
ERM Index	8	Indicate your organization's current stage of ERM development?	This question is adopted from the seminal work of Beasley et al. (2005)

Where ERM Stage reflects a value ranging from 1` to 5 as follows:

ERM STAGE = 5, if complete ERM is in place;

ERM STAGE = 4, if partial ERM is in place;

ERM STAGE = 3, if planning to implement ERM;

ERM STAGE = 2, if investigating ERM, but no decision made yet;

ERM STAGE = 1, if no plans exist to implement ERM.

Table 3. 7 Other Questions about ERM State in the Firms

Survey Section	NO.	Question
	9	Years of Establishment of ERM in the organisation?
	10	The main reason when no ERM in place?
ERM Index	11	Indicate the extent to which your organization's ERM process or risk/control process formally identifies, assesses, and responds to these risk categories?
	12	Is there a management-level risk committee?

3.10.3 Section 3: ERM Determinants

This section of the survey covers ERM determinants which consist of five questions. Three of these question will be used to examine the firm's characteristics that influence ERM successful implementation. The data that will be obtained using these three items are those related to, CRO presence in the firms, big four audits firms and board of directors monitoring. This section answers the research question number three (see tables 3.8, 3.9).

Table 3. 8 Determinants of ERM Main Questions

Survey Section	NO.	-Question	Reference
	13	Is there a CRO overseeing your company ERM programme?	Adapted from Kleffner et al., (2003)
	14	To what extent is the implementation of ERM in your firm affected by your Audit firm (Big 4 Audit firms) activities?	Adapted from the seminal work of Beasley et al. (2005)
Determinants of ERM	16	Who/What are the primary drivers of your ERM programme?	Adapted from Muthuveloo and Ai Ping, (2015) and Kleffner et al. (2003)

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Table 3.9 Other Determinants of ERM Questions

Survey Section	NO.	Question
	15	To whom does the CRO or the senior executive overseeing ERM report?
Determinants of ERM	17	Based on our firm's ERM stage, please indicate the extent of Big Four audits firms activity in the following areas using a scale from 1= not at all to 5= extremely?
	17.1	Supporting ERM leadership in the company?
	17.2	Providing ERM training?
	17.3	Involved in risk assessment?
	17.4	Engaging in risk responses (accepting, avoiding, mitigating)?
	17.5	Monitoring ERM process?

3.10.4 Section Four: Risk Culture

This section of the survey is designed to examine the relationship between the firms' risk culture and the successful implementation of their ERM programme. The section consists of four questions, where two of them will be included in the regression equation. This part is related to the research question number 4 (See tables 3.10, 3.11).

Table 3. 10 Risk Culture Question:

Survey Section	NO.	Question	Reference
	18	How has your organisation culture impacted the effectiveness of ERM?	Adapted from the seminal work of Kimbrough and Componatio (2015)
Risk Culture	21	How has your organisation's culture impacted how quickly ERM is/was implemented?	Adapted from the seminal work of Kimbrough and Componation (2015)

Table 3. 11 Other Risk Culture Questions

Survey Section	NO.	Question
Risk Culture	19	The company ensure the employee is informed about ERM?
	20	Who receives ERM training?

3.11 Data Collection of Other Variables

The data of this research are collected from both primary and secondary sources. The ERM variable (ERM Stage) and other determinants of ERM such as the board of director monitoring (BOD), the presence of chief risk officer (CRO), the presence of big four auditing firms (big4), and risk culture were obtained using an online survey tool which has been sent to all the North American energy and natural resources companies listed in NYSE and NASDAQ.

The sources of other independent, dependent, and control variables of firm performance and other accounting ratios were obtained from for company's annual reports and Y-Charts database. Y-Charts generally contains the companies' profiles, stocks information, financial statements, performance measures, companies' key ratios and other daily trading information and press releases from all the American listed companies. Y-Charts data are digital and downloadable, and it is accessible through an annual subscription to the cloud database. This database holds data for at least ten years, which is considered sufficient for this study. In case any information was not available, other public sources were used, such as Morningstar and ADVFN.

3.12 Conceptual Models and Variables Definition

This section includes the conceptual models and variables definition of this research.

As discussed the in chapter two, the main conceptual model of the study is divided into two separated models as per the regression equations and presented in this chapter.

3.12.1 ERM and Firm Value Conceptual Model and Variables Definition
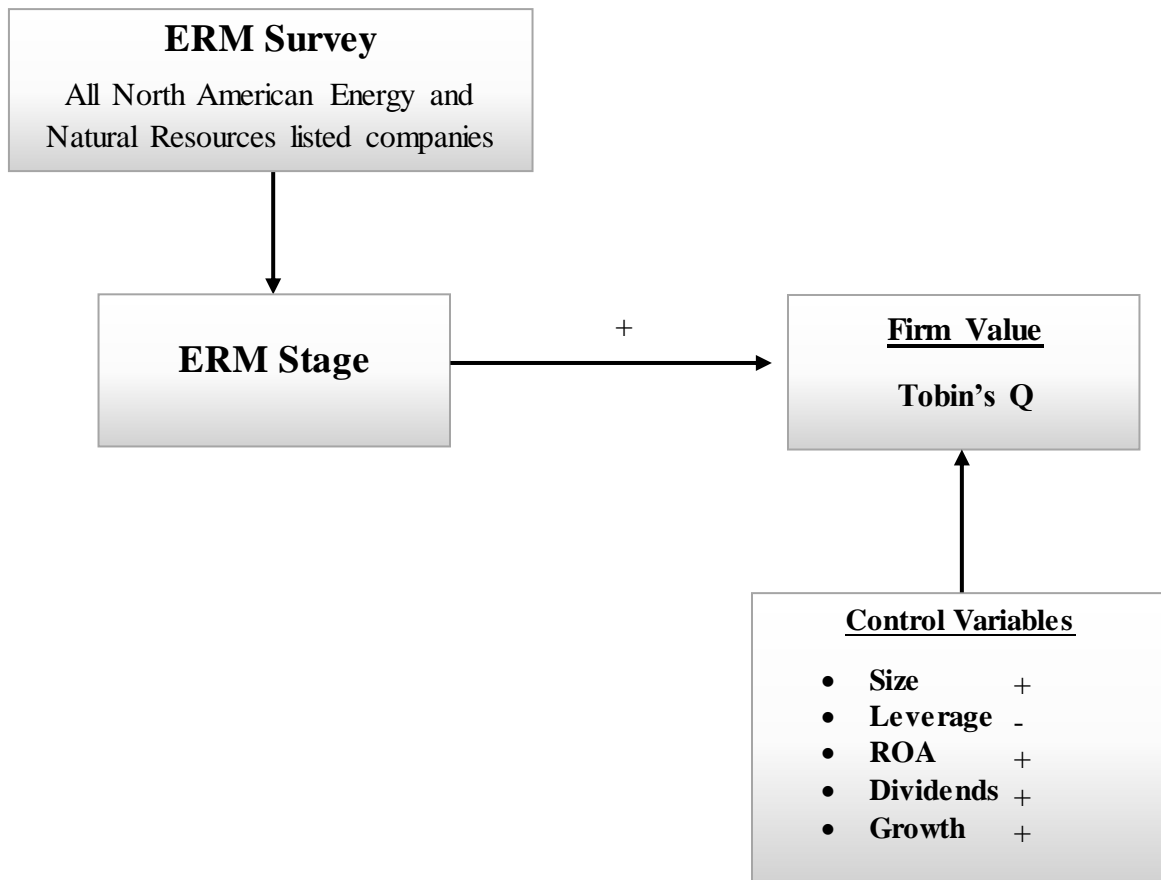
Figure 3. 2 Conceptual model on the relationship between ERM and firm value

For examining the relationship between ERM Stage, the control variable and firm value, the following Stepwise Regression equation has been used:

Equation 1:

$$\text{Tobin's } Q = \beta 0 + \beta 1 ERM\ STAGE + \beta 2 SIZE + \beta 3 LEVERAGE + \beta 4 ROA + \beta 5 DIV + \beta 6 GROWTH$$

Where Tobin's Q is used as a proxy for firm value, which represents the market value of the firm's assets in proportion to their replacement costs (see, e.g., Hoyt and Liebenberg, 2011; McShane et al., 2011, Gatzert and Lechner, 2017).

$$\textbf{Tobin s Q} = \frac{\text{The market value of equity} + \text{Book value of liabilities}}{\text{Book value of total assets}}$$

Where the market value of equity (MVE) is approximated by the current stock price multiplied by the number of outstanding common stock shares; however, if a company offers preference stocks, the share price of these stocks and number of stock shares should also be included in the equation (see Chung and Pruitt, 1994). Book value of liabilities is long term debt plus notes payable plus the current portion of long-term debt. Book value of total assets is the total value of assets less any expenses attached to it.

A Tobin's Q value higher than one indicates an adequate utilisation of the company's assets. A Q less than one implies that it costs higher to replace the company's asset than the company value (see Lindenberg and Ross, 1981) (see also, NASDAQ, 2018). In investment valuation, Damodaran (2002) postulates that a Q value less than one indicates that a firm is generating less than it is required of return on investment (ROI) and a Q value higher than one means that the company generate positive ROI. One of the main advantages of using Q is that "it does not require risk-adjustment or normalisation" (see Hoyt and Liebenberg, 2011, p 9) and is hardly subject to managerial manipulation (see Lindenberg and Ross, 1981). This is congruent with the seminal work of Lang and Stulz (1994), where they stated that Tobin's Q is favourable compared to other performance valuation measures such as stock returns or accounting measures (ROA and ROE). Also, choosing Tobin's Q over accounting measures (ROA and ROE), benefit from having a future view of the company performance instead of merely assessing its historical performance. While the benefits of implementing an ERM programme is not expected to be recognised immediately but rather over time, it more convenient to use Tobin's Q to examine its effect on firm value (see Hoyt and Liebenberg, 2008).

3.12.2 The Control of Variables of Equation One

For isolating the relationship between ERM and Tobin's Q, the study controls for other firm variables as presented in Equation (1), which are explained below.

Firm Size: A considerable number of studies on the firm characteristics that influence ERM programme implementation found a positive relationship between firm size and ERM adoption. However, many researchers who mainly studied ERM and firm value found a negative relationship between firm size and firm value. Some of these researchers attributed this problem to high agency cost, which incurs larger firms (see, e.g., Lang and Stulz, 1994; Allayannis and Weston, 2001). Nevertheless, some researchers assume that a larger firm size leads to a substantial increase in firm value due "to the greater market power and economies of scale and lower insolvency risk" (see McShane et al., 2011, p 647). Given that firm size had been used in different formulas and definitions, this study adopts the definition of Desender (2011), which is measured by the natural logarithm of total assets. This study expects a positive relationship between firm size and firm value.

Financial Leverage: Previous ERM studies also found an ambiguous relationship between leverage and firm value. Some researchers and industry professionals argue that a highly leveraged firm possibly create value by decreasing free cash flow (FCF) that could be invested in unprofitable projects (see Hoyt and Liebenberg, 2011). Few others postulate that an increasing debt ratio may enable tax savings, which may increase firm value (see Tahir and Razali, 2011). On the contrary, a highly leveraged firm may increase the possibility of financial distress (see Hoyt and Liebenberg, 2011). Following Gatzert and Lechner (2017), Hoyt and Liebenberg (2011) and Farrell and Gallagher (2015), this study defined debt ratio as the total liabilities to the market value of equity. This study expects a negative relationship between leverage and firm value.

Return on Assets: Generally, profitability ratios such as ROA and ROE are commonly accepted as significantly associated with firm value in the literature (see Allayannis and Weston, 2001). Therefore, the return on assets ratio (ROA), defined as net income divided by total assets, is used as a control variable for profitability (see, e.g., Hoyt and Liebenberg, 2011; McShane et al., 2011; Gatzert and Lechner, 2017). To control for firm profitability, we include return on assets (ROA) in the regression model. ROA is calculated as net income divided by total assets. This study expects a positive relationship between Return on Asset (ROA) and firm value.

Dividends: Similar to Hoyt et al. (2011) and Allayannis et al. (2001), the dividend has been included in the regression model of this study as a dummy variable equal to one if the firm paid a dividend in the current year or zeroed otherwise. The relationship between dividend and firm value is not clear in the literature. Investors may consider a firm paying dividend as a sign of weak or slow growth opportunities. In this case, dividends payment indicates a negative firm performance. On the other hand, dividends are favourable by many investors because it reduces free cash flow that could be exploited for managerial perquisite consumption. This study expects a positive relationship between dividends and firm value.

Sales Growth: Many ERM scholars (e.g. Myers 1977) have proved that there is a significant relationship between sales growth and firm value. Hence sales growth has been used as a control variable between ERM and firm value in a considerable number of studies (Hoyt et al., 2011; McShane et al., 2011; Li et al., 2014). Following Hoyt et al. (2011), this study uses historical (1 year) sales growth as a proxy of profitability. Sales growth is expected to have a positive relationship with firm value positively

Table 3. 12 ERM and Firm Value, Variables Description

Variable	Definition	Source
ERM stage	**Ordinal Scales rated from 1 to 5** Where ERM STAGE = 5, if complete ERM is in place; ERM STAGE = 4, if partial ERM is in place; ERM STAGE = 3, if planning to implement ERM; ERM STAGE = 2, if investigating ERM, but no decision made yet; ERM STAGE = 1, if no plans exist to implement ERM.	The questionnaire has been sent to all the energy and natural resources firms listed in NASDAQ and NYSE.
Firm size	Book value of total assets (the natural logarithm)	• Annual reports • Y-Charts
Leverage	Total debt/ Total Equity	• Annual reports • Y-Charts • Morningstar
Dividends	Dummy variable = 1 if the company paid a dividend in the year t or = 0 if not	• Annual reports • Companies press releases
Sales growth	(Current Period Net Sales - Prior Period Net Sales) / Prior Period Net Sales * 100	• Annual reports (income statement) • Y-Charts
ROA	Net income / total assets	• Y-Charts • Morningstar

3.12.3 Determinants of ERM Implementation

Similar to the majority of studies on the effect of ERM on firm value, many studies on the influential factors of ERM implementation (Determinants of ERM) mainly used ERM proxies and secondary data for measuring ERM stage of implementation in the firms (e.g. Liebenberg and Hoyt, 2003, Hoyt and Liebenberg, 2011, Pagach and Warr, 2011, Razali et al., 2011, Golshan and Rasid, 2012). Evidence like the presence of Chief Risk Officer (CRO), Board monitoring, and other main influential factors had also been collected from secondary sources such as press releases and annual report. Unlike many previous studies, this thesis collected

ERM implementation variable as well as all the determinants of ERM variables using a comprehensive online survey. Figure 3.5 presents the conceptual framework of the determinants of ERM implementation.
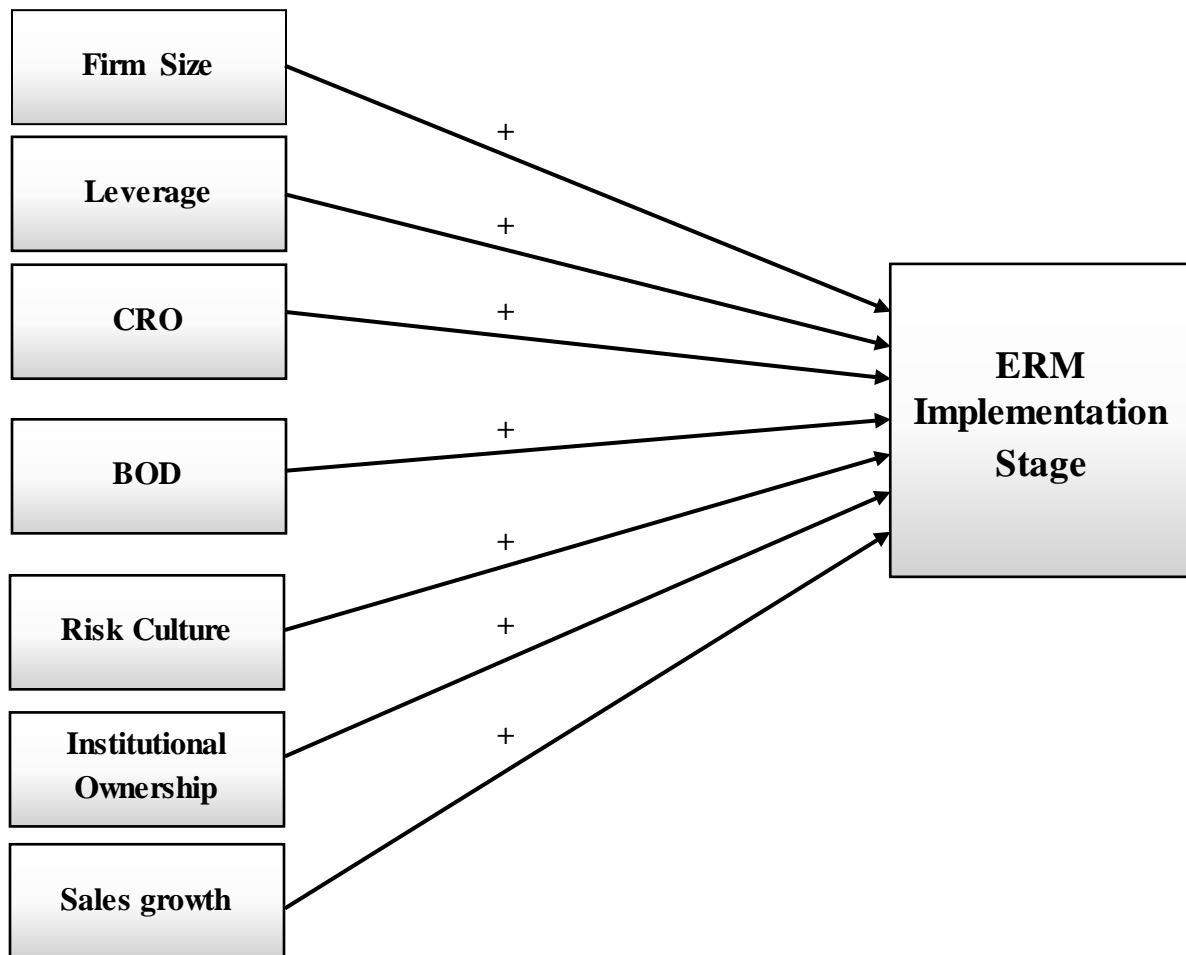
Figure 3. 3 ERM implementation of influential factors

For examining the determinants of ERM implementation, the following ordinal logistic regression equation is developed as follow:

ERM stage $= f$ (SIZE, LEV, CRO, BIG4AUDIT, BOD, RCULTURE, GROWTH, INST)

The variables of the determinants of ERM model, their definitions and their source are presented in table 3.13 below.

Table 3. 13 ERM Determinants-Variables Definition

Name of the Variable	Definition	Source
ERM stage	**Ordinal Scales rated from 1 to 5** Where ERM STAGE = 5, if complete ERM is in place; ERM STAGE = 4, if partial ERM is in place; ERM STAGE = 3, if planning to implement ERM; ERM STAGE = 2, if investigating ERM, but no decision made yet; ERM STAGE = 1, if no plans exist to implement ERM.	An online survey questionnaire has been sent to all the energy and natural resources firms listed in NASDAQ and NYSE.
Firm size	Book value of total assets	• Annual reports • Y-Charts
Leverage	Total debt/ total Equity	• Annual reports • Y-Charts
Institutions	Amount of shares owned by institutions	• Annual reports • Y-Charts
Sales growth	(Current Period Net Sales - Prior Period Net Sales) / Prior Period Net Sales * 100	Income statements taken from annual reports
Board of directors monitoring	BOD is a dummy variable =1 if the firm BOD influence ERM decision and =0 otherwise	Online survey questionnaire
Big four auditing firm (KPMG, EY, Deloitte or PricewaterhouseCoopers)	BIG 4 is a dummy variable =1 if the company has a Big Four auditor and =0 otherwise	Online survey questionnaire
CRO	CRO is a dummy variable = 1 if the firm has a CRO position. Otherwise = 0.	Online survey questionnaire
Risk Culture	Is a dummy variable= 1 if the company culture support ERM implementation and =0 otherwise.	Online survey questionnaire

3.13 Data Treatment and Normality

After completing the data collection stage, all the data has been examined for consistency and

missing values. The data was coded and entered into IBM SPSS 24 for data management and

analysis. The listwise approach has been adopted for managing missing data. Values that were incomplete or missing were removed from the dataset (Brown, 1983) (see also Carter, 1999). The data input was analysed using basic descriptive statistics (means, standard deviations and ranges) which describes the basic features of the research variables. It also provides simple summaries about the sample and the measures. (Trochim et al., 2016).

In order to check whether the population is normally distributed, the Shapiro-Wilk test (Shapiro, 1965) and Kolmogorov-Smirnov (Kolmogrov, 1933, Conover, 1999) had been computed. Given that both the Shapiro-Wilk test and Kolmogorov-Smirnov test are subject to some limitations such as unreliability when applied on a large sample (e.g., n>3000) (see Kim, 2013), skewness and kurtosis were employed to resolve the problem. Also, both the Q-Q plot and histogram where used in testing the univariate normality.

In his landmark work "financial statement analysis", Foster (1978) postulated that the treatment of outliers is crucial in financial ration analysis. An outlier occurs when the distribution includes some extreme values that can dominate the parameter estimates (see Hopwood and Frecka, 1998). Cochran (1963) stated that this departure from normality leads to an increase in the sample variance and a decrease in precision. He argues that "it is wise to segregate them and make separate plans for coping with them, perhaps by taking a complete enumeration if they are not numerous. This removal of extremes from the main body of the population reduces the skewness and improves the normal approximation" (Cochran, 1963, p 102). Therefore, extreme outliers were deleted from the ratios dataset (Tobin's Q, Leverage, and ROA) after careful consideration.

3.13.1 Cronbach Alpha

For collecting data about the current state of ERM in the North American energy and natural resources sector, a survey of multiple-item scale has been used. It is commonly accepted amongst researchers that the scale should be tested for reliability. Scale reliability is defined as

"the degree to which measures are free from error and therefore yield consistent results" (Peter, 1979, p 6). While Cronbach's alpha (Cronbach, 1951) is considered one of the most effective measures of a reliability coefficient (see, e.g. Peterson, 1994, Gliem and Gliem, 2003, Tavakol and Dennick, 2011), it has been used to test the reliability of the survey scales in this study. Cronbach's alpha is formulated as:

$$\alpha = \frac{k}{k-1}\left[\frac{\sigma_\tau^2 - \sum_{i=1}^{k}\sigma_i^2}{\sigma_\tau^2}\right]$$

Where k is the number of items, and σ_i^2 is the variance of each item, and σ_τ^2 is the variance of the total score formed by summing all the items. Cronbach alpha should be applied on a minimum of two survey items where k is less than one (k<1), or á will be undefined (Rawles, Silcock and Vale, 1997). In the equation posted above, k is a correction parameter. In case conformity revealed on the numeric answers, then σ_τ^2 will be rather large, which impact α result where α will equal 1. In random answers will lead σ_τ^2 to be comparable with the sum of the individual variances (σ_i^2), which in turn will lead α to tend to 0 (see Leontitsis and Pagge, 2007).

In order to ensure choosing a sufficient reliability degree for Cronbach's alpha test, this study has relied on Peterson (1994) work, which compared the reliability levels of many research studies. The reliability coefficients are shown in Table 3.14. Alpha coefficients should be more than 0.7-0.8 for basic research and more than 0.95 for applied research.

Table 3. 14 Recommended Cronbach's Alpha Results

Author	Description	Level
Davis (1964)	Prediction for individual	> 0.75
	Prediction for group of 25-50	> 0.5
	Prediction for group over 50	< 0.5

Table 3. 14 Recommended Cronbach's Alpha Results (Continued)

Author	Description	Level
Kaplan and Saccuzzo (1982)	Basic research	0.7-0.8
	Applied research	0.95
Murphy and Davidshofer (1988)	Unacceptable level	< 0.6
	Low level	0.7
	Moderate to high level	0.8-0.9
	High level	0.9
Nunnally (1967)	Preliminary research	0.5-0.6
	Basic research	0.8
	Applied research	0.9-0.95
Nunnally (1978)	Preliminary research	0.7
	Basic research	0.8
	Applied research	0.9-0.95

(Source, Peterson, 1994)

3.14 Data Analysis of ERM Equations

3.14.1 Pearson Correlation Coefficient (r)

After conducting the descriptive statistics analysis, the normality test and the reliability test, the data were tested for correlation. Unlike Spearman Rank, which mainly measures the correlation between nominal or ordinal data, the Pearson Correlation Coefficient is a measure of the linear relation between two interval-ratio variables. The measure is represented by "r", which fluctuates from –1 to +1. A correlation result = 0 means that there is no relationship between the variables (Singh, 2007). The Pearson Correlation Coefficient has been computed for ERM and firm value equation and the determinants of ERM equation.

3.14.2 Variance Inflation Factor

Before conducting the regression model of this study, a multicollinearity test was applied. This is due to the likelihood of multicollinearity between the independent variables in the regression

equation. In the case of multicollinearity, an increase in the variance between the model variables could occur. Consequently, the regression equation will be affected negatively, and some variables may not have a valuable contribution to the model (Belsley, Kuh & Welsch, 1980).

Established by Farrar and Glauber (1967), the Variance Inflation Factor (VIF) is a multicollinearity test (Alin, 2010) that examine the inflation of the parameter estimates being tested for all independent variables in the model. VIF is formulated as $(1/(1- R^2_j)$ where R^2_j is the coefficient of determination for the explanatory variable.

After computing the VIF, each independent variable in the equation will produce an R2 value and VIF value. If for instance, an independent variable is highly correlated with the remaining variables in the equation, its VIF will be very large. While Farrar Glauber (1976) considered a VIF $\geq$ 10 indicates multicollinearity (Farrar and Glauber, 1976; Belsley, Kuh, & Welsch, 1980), a considerable number of researchers presumed the existence of multicollinearity at a much lower rate. For example, Adeboye et al. (2014) consider a VIF $\geq$ 2.5 as an indication of multicollinearity, whereas Vu et al. (2015) assume that an equation-free from multicollinearity is that which have a VIF equals to 1 (see Agalgaonkar et, 2015).

This study agrees with Adeboye et al. (2014) assumptions, where a VIF higher than 2.5 was deemed as evidence of multicollinearity.

3.14.3 Multiple r (R)

Just as "r" (Pearson correlation coefficient) examines the correlation between two variables, R determines the strength of the linear relationship (Deviant, 2014). In other words, it measures the relationship between a dependent variable and two or more Independent variables. Unlike r which takes a range between -1 and 1, R is limited for values between 0 and 1, where 0 indicates no relationship with the independent variables and 1 indicates a strong relationship

(see Cohen and Becker, 2003). R is most commonly denoted as multiple correlation coefficient (Kasuya, 2019).

3.14.4 R ^{2} (R-Squared)

The coefficient of determination or R ^{2} "is the proportion of variation of one variable (objective variable or response) explained by other variables (explanatory variables) in regression" (Kasuya, 2019, p 1). This is a widely-used measure of the strength of the relationship in regression (see Kasuya, 2019; Cohen, 2003). R^2 is defined as:

$$1 - \frac{\sum_{i=1}^{n}(y_i - \hat{y}_i)^2}{\sum_{i=1}^{n}\left(y_i - \overline{y}\right)^2,}$$

Where nominator of the equation is the residual total sum of squares divided by the dominator, which is the total sum of squares of y. Given that the value of the residual sum of squares (SS$_{residual}$) is between 0 and the sum of squares of y, R^2 can have the value from 0 to 1 or 0 to 100%. However, in a specific condition in which the linear regression model contains only one independent variable (x), R^2 coefficient is equal to the square root of r (Pearson correlation coefficient). Hence, the residual sum of squares is given by the following equation:

$$\sum_{i=1}^{n}(y_i - \overline{y})^2 - \left\{\sum_{i=1}^{n}(x_i - \overline{x})(y_i - \overline{y})\right\}^2 / \sum_{i=1}^{n}(x_i - \overline{x})^2 \quad \text{(Draper \& Smith, 1981).}$$

By substituting this equation into R^2 main equation posted above, R^2 in this special situation is formulated as:

$$\left\{\sum_{i=1}^{n}(x_i - \overline{x})(y_i - \overline{y})\right\}^2 / \left\{\left(\sum_{i=1}^{n}(x_i - \overline{x})^2\right)\left(\sum_{i=1}^{n}(y_i - \overline{y})^2\right)\right\}$$

While the Pearson r indicates the association between two variables only, R^2 (coefficient of determination) can be with multiple independent variables. The multiple correlation coefficient, which is commonly referred to as R, is the square root of R $^{2.}$

3.14.5 Adjusted R-Squared

"Adjusted R^2 is a corrected goodness-of-fit (model accuracy) measure for linear models. It identifies the percentage of variance in the target field that is explained by the input or inputs. R^2 tends to optimistically estimate the fit of the linear regression" (IBM, 2019) (see also, Karch, 2019). While R^2 increase or decrease based on the number of variables that are added to the model, Adjusted R^2 tries to amend the overestimation (Miles, 2014; Singh, 2007). In case an ineffective independent variable is added to the model, the Adjusted R^2 might decrease. Adjusted R squared is defined as:

$$\text{Adj.}\, R^2 = 1 - (1 - R^2)\frac{N - 1}{N - k - 1}$$

Where N is the sample size, and k is the number of independent variables in the regression module. Adjusted R^2 is always less than or equal to R^2. If Adj. $R^2 = 1$, it indicates a model that predict values in the target field. An Adj. $R^{2 \leq} 0$ indicates a model that has no predictive value. In this study, the Adjusted R^2 has been calculated in the stepwise linear model of ERM and firm value. However, Adjusted R-squared has not been used in the second equation because it is not applicable for ordinal logistic regression. Hence pseudo R^2 has been used.

3.14.6 Pseudo R^2

As discussed above, the adjusted R^2 can only be used in a linear model with a continuous dependent variable. Therefore, the statistician developed the pseudo-R2 measure for regression models with an ordinal dependent variable (see McKelvey & Zavoina, 1975).

Knowing that the determinants of ERM equation of this study contain an ordinal scale dependent variable (ERM stage), the ordinal logistic regression (OLR) has been used. Two types of pseudo-R2 measures were released on SPSS OLR output, Cox and Snell's and Nagelkerke's measurements. Cox and Snell's R^2 is based on calculating the percentage of unexplained variance; however, its theoretical maximum value of less than one has been

severely criticised by many scholars due to the unease of its interpretation. Consequently, Nagelkerke's R^2 was established with a range from 0 to 1. Both Cox and Snell's R^2 and Nagelkerke's R^2, are valid measure of goodness of fit in ordinal logistic regression. Generally, there is no strong guidance in the literature on how to interpret the different pseudo- R^2 tests (see Lomax and Hahs-Vaugn, 2013; Osborne, 2015; Pituch and Stevens, 2016, Smith and Mckenna, 2013)

3.14.7 Chi-Square

Chi-Square Goodness of fit test is computed to examine how the observed value of an event (case) is significantly distinct from the expected value. "In the chi-square goodness-of-fit test, sample data is divided into intervals. Then the numbers of points that fall into the interval are compared, with the expected numbers of points in each interval" (Borman, 2017, p 187).

Chi-Square Goodness of fit is used to test the following hypothesis:

H_0: There is no significant difference between the observed and the expected value.

H_A: There is a significant difference between the observed and the expected value.

There are two types of Chi-square goodness of fit that are reported in IBM SPSS output: the Deviance and the Pearson chi-square.

These are the main tests of the H_0, and their output is a p-value between 0 and 1. It commonly accepted among statisticians that an output p-value higher than α level (0.05) indicates a better fit. Similarly, if the p-value is lowered to α specified level, then the model is deemed not acceptable (see Allison, 2014; Petrucci, 2009).

3.15 Summary

This chapter presented the research design and introduced the methodological choice as well as the conceptual models of this thesis. The quantitative multi-method was chosen to examine the research questions of the study using both primary and secondary data.

Moreover, this chapter justified the research setting, and it explained why the study is conducted on the North American energy and natural resources sector. In order to collect the research data, an online survey tool has been employed. The target respondents of the survey, the survey design and the pilot test are clearly explained in the chapter. Also, the conceptual models of the study are outlined, and the expected effect of each predictor variable on the dependent variable are presented. In the last section of this chapter, the data treatment process and the data analysis techniques are discussed.

The results of the survey tool are explained in the following Chapter. Both the survey and the secondary data are analysed using IBM SPSS in Chapter 5. The discussion of the study results is provided in Chapter 6, and the conclusion and recommendations are presented in Chapter 7.

Chapter Four
Analysis of the Survey Results

4.1 Introduction

This chapter presents the ERM data obtained in the first phase of data collection using the online survey. The descriptive statistics presented in this chapter answer the first research question: *What is the current ERM implementation stage in the North American energy and natural resources publicly traded companies?* The Enterprise Risk Management (ERM) survey aims to develop a more comprehensive view of ERM in the North American energy and natural resources sector exploring the extent to which ERM is integrated into their business processes, and assessing ERM leaders' perceptions of the strength and maturity of their respective risk management strategy.

In February 2019, the online survey questionnaires were sent for all the North American energy and natural resources companies listed in NYSE and NASDAQ (N = 392). The surveys comprised 21 close-ended questions (5 points Likert scale and categorical questions) about ERM current state in the firms and the influential factors of its successful implementations. The data collection process took approximately five to six month. The survey was explicitly directed at the person in each organisation responsible for ERM (CROs, CEOs, CFOs, and other senior risk management positions). In total, 137 survey responses were received from a total of 392 listed companies. However, 12 of the survey responses were incomplete, and some financial data of six other companies were not disclosed for the year 2018-2019 (mainly Tobin's Q). Therefore the final number of responses that have been examined in this study is 119. The survey results are presented in this chapter.

Given that this study adopts a quantitative multimethod design, as discussed in chapter three, the results of this phase are essential for planning the second phase (Morse, 1991, Tashakkori and Teddlie 2010). In other words, to answer the three other research questions, the researcher

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collected the secondary data only from the companies who participated in the survey (n=137). In addition, the variables ERM stage and other predictor variables that are essential for analysing the effect of ERM on firm value model and for examining ERM determinants model that are presented in section 3.12 (chapter three), are obtained from the survey.

Finally, this chapter is expected to add to the body of knowledge on the current state of ERM in the North American energy and natural resources sector. For the author's knowledge, the only study that focused on this particular sector in North America is that of Walker (2015), and his study mainly focused on the energy industry while evidence about ERM state in the North American natural resources sector is still unknown.

4.2 Background of the Respondents
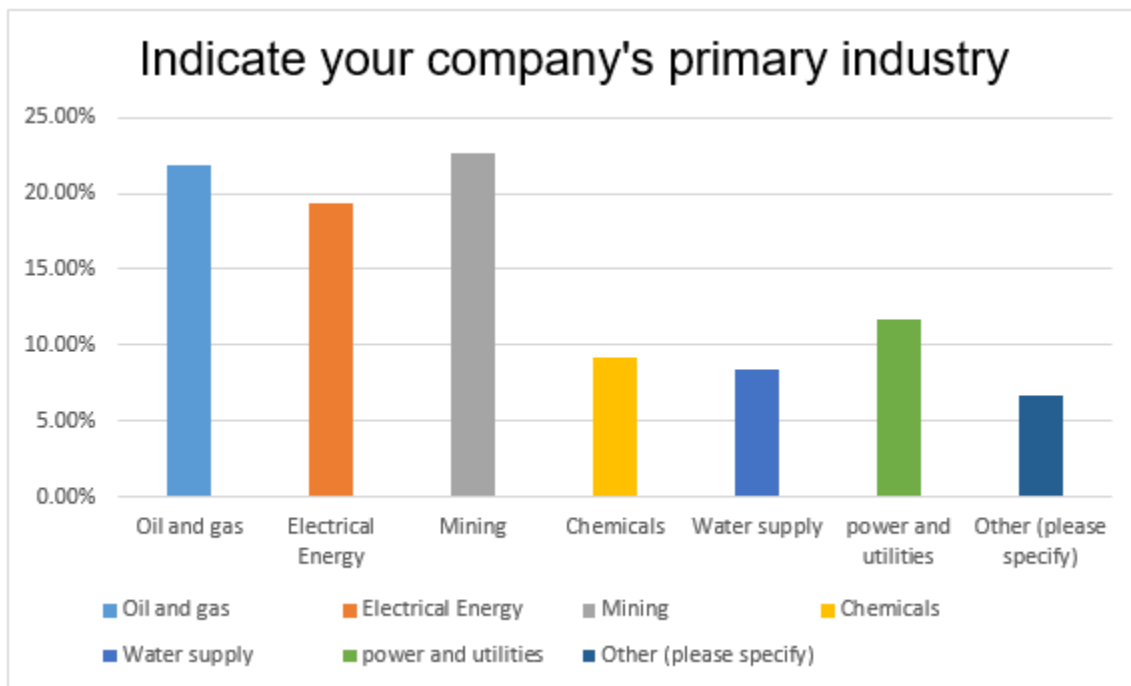
Figure 4. 1 Respondents primary industry

As discussed before, a total of 137 North American energy and natural resources companies participated in this study, but 18 of them had been excluded from the sample due to missing primary information. Therefore only 119 responses have been analysed. As illustrated in Figure

4.1, the survey respondents belong to different energy and natural resources industries with 27 (22.69%) mining and minerals, followed by 26 (21.85%) oil and gas firms, 23 (19.33%) electrical energy, 14 (11.76%) power and utilities, 11 (9.24%) chemicals, 10 (8.40%) water supply, and 8 (6.72%) others.

Table 4. 1 The Respondents' Primary Industry

Answer Choices	Responses	N
Oil and gas	21.85%	26
Electrical Energy	19.33%	23
Mining	22.69%	27
Chemicals	9.24%	11
Water supply	8.40%	10
power and utilities	11.76%	14
Other (please specify)	6.72%	8
	Answered	119

As discussed before, a total of 137 North American energy and natural resources companies participated in this study, but 18 of them had been excluded from the sample due to missing primary information. Therefore only 119 responses have been analysed. As illustrated in Figure 4.1, the survey respondents belong to different energy and natural resources industries with 27 (22.69%) mining and minerals, followed by 26 (21.85%) oil and gas firms, 23 (19.33%) electrical energy, 14 (11.76%) power and utilities, 11 (9.24%) chemicals, 10 (8.40%) water supply, and 8 (6.72%) others.

Figure 4.2 shows the percentage of the annual total revenue of the respondents' organisations. Most of the respondents (49 companies or 31.93%) have annual revenue of more than $1 billion to $5 billion (£900 million - £4.2 billion). Secondly, 38 companies had total annual revenue of more than $5 billion (< £4.2 billion). Eighteen companies had more than $500 million to $1 billion (£424 million to £900 million), and 14 companies had total revenue of $500 million or below (£424 million or below).
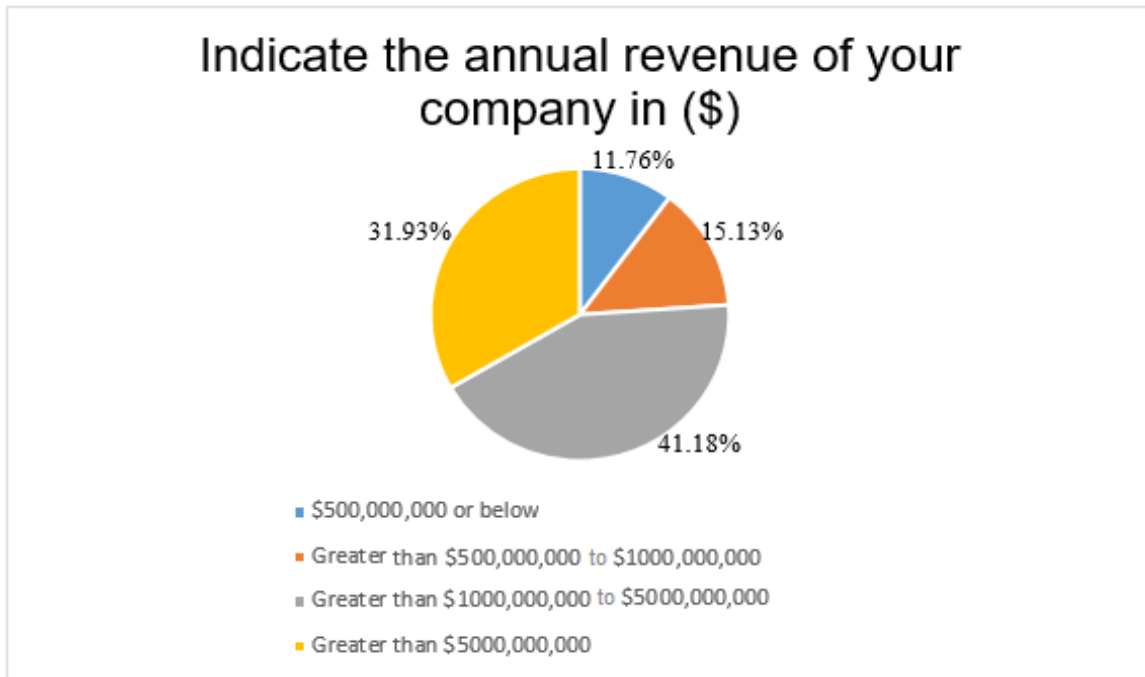
Figure 4. 2 Respondents annual total revenue

Table 4. 2 The Respondent's Annual Revenues

Answer Choices	Responses	*N*
$500,000,000 or below	11.76%	14
Greater than $500,000,000 to $1000,000,000	15.13%	18
Greater than $1000,000,000 to $5000,000,000	41.18%	49
Greater than $5000,000,000	31.93%	38
	Answer	**119**

4.2.3 Respondents' Demographics

The respondents' demographics were considered in terms of their ages, highest education level, and years they worked in the firm as well as their current position. Table 4.3 provides descriptive statistics that are related to these variables.

Table 4. 2 Respondent's Demographics Descriptive

	Answer Choices	%	*N*
1. Age	Under 30	12.61%	15
	Between 30 and 40	26.89%	32
	Between 40 and 50	38.66%	46
	Over 50	21.85%	26
2. Education level	Bachelor's degree	36.13%	43
	Master's Degree or higher	63.87%	76
3.Years working in the firm	Less than four years	15.97%	19
	4 to 8 years	34.45%	41
	8 to 12 years	29.41%	35
	12 to 16 years	15.13%	18
	more than 16 years	5.04%	6
4.Current position	Chief Executive Officer	5.88%	7
	Chief Financial Officer	20.17%	24
	Chief Risk Officer	32.77%	39
	Manager	26.89%	32
	Other (please specify)	14.29%	17

The survey targeted the industry professionals leading ERM in the North American energy and natural resources firms. Of the respondents, 32.77 per cent have the position of Chief Risk

Officer (CRO), a role which belongs to the senior executives' team (C-suite). The second-largest category of respondents (26%) is the manager position. Next, 20.17% of the respondents indicated their job title as Chief Financial Officer, while another 14.29 % belong to others category (risk managers, risk analyst, head of the risk, accountant). Finally, Chief Executive officers role represents only 5.88% of the survey participants. These results highlight the importance of CRO role, especially in the firms' who have an ERM programme in place.

For ensuring that the respondents understand the culture and the overall process of ERM in their firms, the demographic section included a question about the respondent's year of work in their organisations. 34.4 % of the respondents stated that they have between 4 to 8 years of work experience in their organisations, followed by 29.4% between 8 to 12 years. Approximately the same percentage stated that they have been working between 4 to 8 years and 12 to 16 years (15.97%5 and 15.13% respectively) in the firm, while only 5.88% said that they have been in the firm for more than 16 years.

Another critical factor which has been taken into consideration in the respondent's demographic questions is ensuring that the survey participants have a proper risk knowledge and are skilled and capable with the right qualifications to participate in the survey. Interestingly the overwhelming majority of respondents stated that they hold a Masters degree or higher (63.87% or 76 respondent), while only 36.15% (43) has a Bachelors degree.

Finally, 38.66% of the respondents belong to the age group between 40 and 50, 26.89 % are between 30 and 40 years old, 21.85% over 50 and 12.61% under 30.

4.3 Current State of Enterprise Risk Management
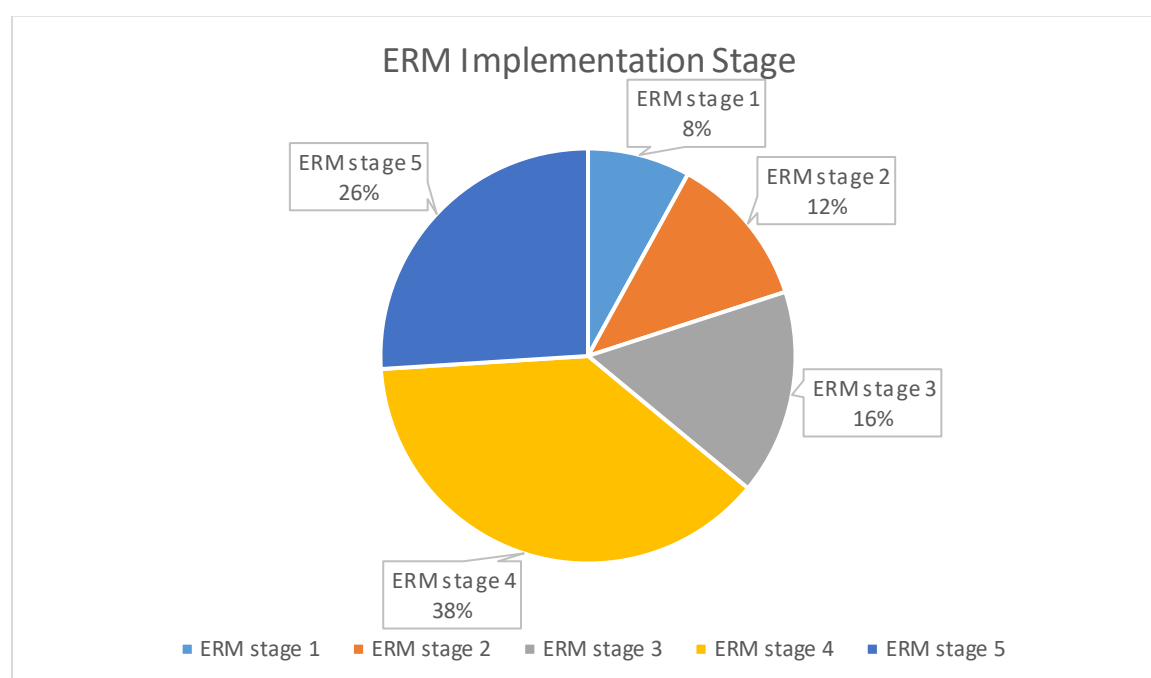
Figure 4. 3 Current state of ERM

Table 4. 3 ERM Stage in the Firms

Answer Choice	%	N
ERM STAGE 5 = Complete ERM in Place	26%	31
ERM STAGE 4 = Partial ERM in Place	38%	45
ERM STAGE 3 = Planning to Implement ERM	16%	19
ERM STAGE 2 = Investigating ERM, No Decision Yet	12%	14
ERM STAGE 1 = No Plans to Implement ERM	8%	10

As discussed in chapter three, many researchers who studied ERM, mainly focused their studies on the financial service and insurance sector. Only a few studies targeted the energy and natural resources industry, although it is highly exposed to a wide range of risks. In addition, the vast majority of these studies mainly relied on secondary data (e.g. keyword search in annual reports) for identifying ERM state in the firms.

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Given this critical limitation in ERM literature, this survey aims to fill this gap in the knowledge of ERM. Therefore, a key question was included about the extent to which the organisations of the survey participants have implemented an ERM.

Twenty-six per cent of the respondents have fully implement ERM programmes; indicating that their ERM programme addresses all risks across the entire firm. Another 38% (45) of respondents have partially implemented an ERM, which means that ERM activities are being practised at the corporate level-strategy and in multiple-business units. By combining these two categories (ERM Stage 5 and ERM Stage 4), it is safe to consider that the majority (64%) of the North American energy and natural resources companies surveyed have some form of ERM programme in place. (See, Figure, 4.3). On the other hand, 16% of the respondents who do not currently have an ERM programme are planning to implement one, while another 12 % claimed that they are investigating ERM, but they did not decide to implement it yet. The remaining ten respondents (8%) stated that their organisation have no plans to implement an ERM programme.

4.3.1 Years since ERM Establishment in the Firm
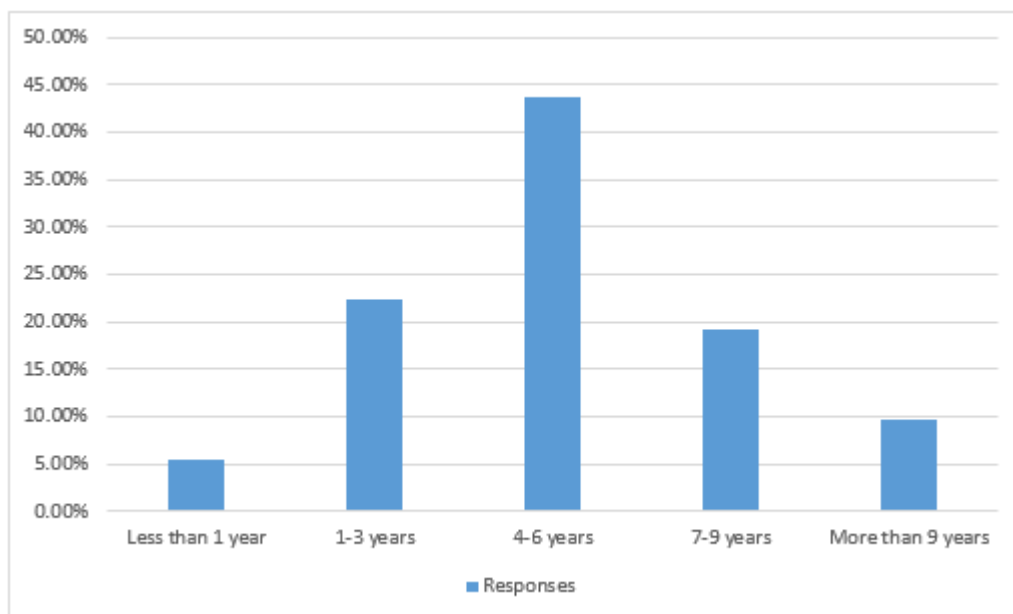
Figure 4. 4 Years since ERM establishment programme

Another essential variable in this study is the maturity level of the ERM programme. Therefore a question had been included in this survey for investigating the years since ERM establishment in the firms. Figure 4.4 shows that the largest number of companies (43%) had established their ERM programme four to six years ago. Almost one-quarter (22.34%) indicated that they implemented their programme one to three years ago. 19.15 % reported that their ERM programme had existed between 7 to 9 years, followed by 9.57% of respondents who stated that their company's adopted ERM for more than nine years. Only 5% of the respondents had an ERM function less than one year ago. These results confirm that ERM remains a new practice in the North American energy and natural resources sector.

4.3.2 The Main Reason When No ERM Framework in Place

Figure 4.5 shows that the main reason (47%) for not having any Enterprise Risk Management activities (ERM) in place is the fact that it is not high enough up the agenda of the board and other governance bodies (Audit Committee or Management Committee). Other reasons for not having an ERM programme is the shortage of resources (budget, staff) (33.33%), or that they do not see the advantage of its adoption 8.33%).
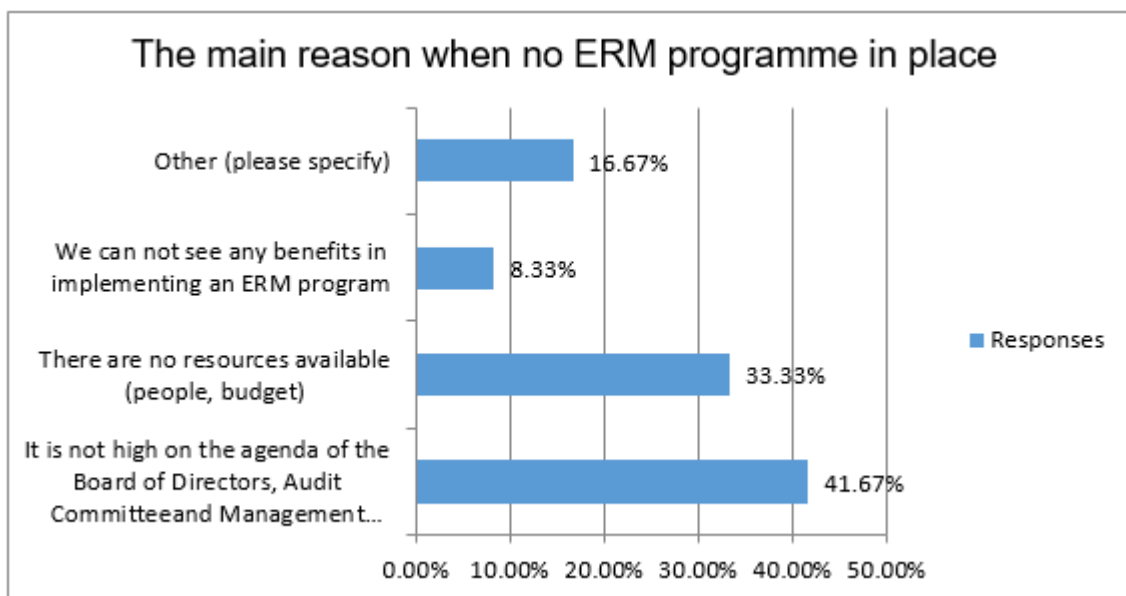
Figure 4. 5 Primary reason when no ERM in place

4.3.3 Risk Management Committee
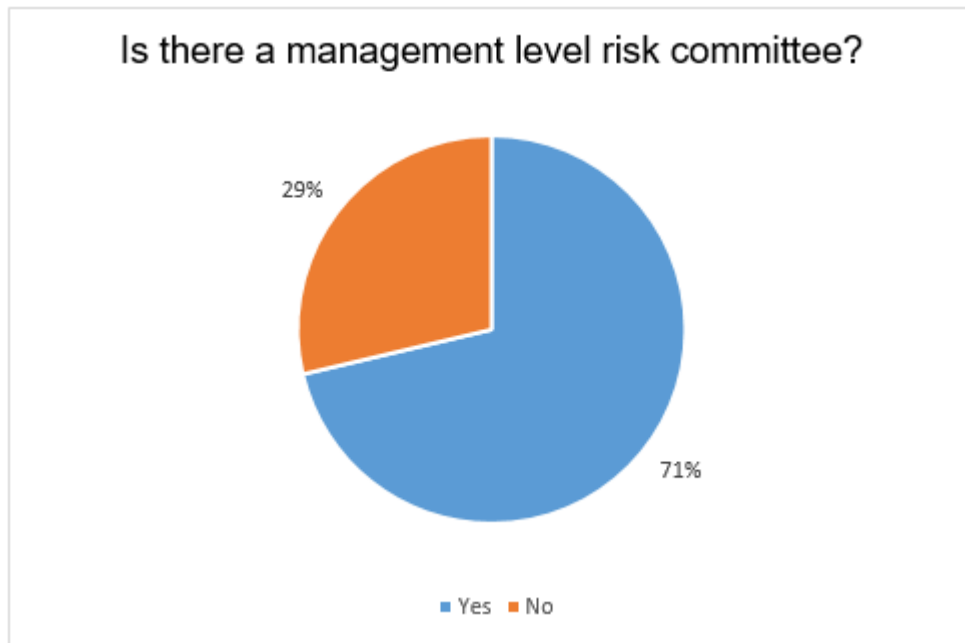
Figure 4. 6 Presence of Risk Management Committee

The risk management committee is considered the main body in the organisation which is responsible for overseeing the risk management system, as well as managing the firm's risk appetite (PWC, 2016). As presented in figure 4.6, the vast majority of the respondents indicated that they have a risk management committee within their organisation (71%; n= 82), while 29% stated that they do not have one.

4.4 Determinants of ERM

4.4.1 ERM Leadership

Proponents of ERM urge the firms which decide to implement an ERM to hire a senior executive for overseeing and coordinating the programme (see, Hoyt et al., 2011). The responsible person is required to report ERM activities to the senior management of the organisation. In the last decade, many firms introduced the position of Chief Risk Officer (CRO) as a board-level appointee, who report directly to the CEO or CFO. Figure 4.7 shows that almost three-fourths of the respondents have an ERM lead or CRO position in place. These

results are similar to those of Walker (2015), who found that 70% of the energy companies in North America had appointed a CRO or a senior executive overseeing their ERM function.
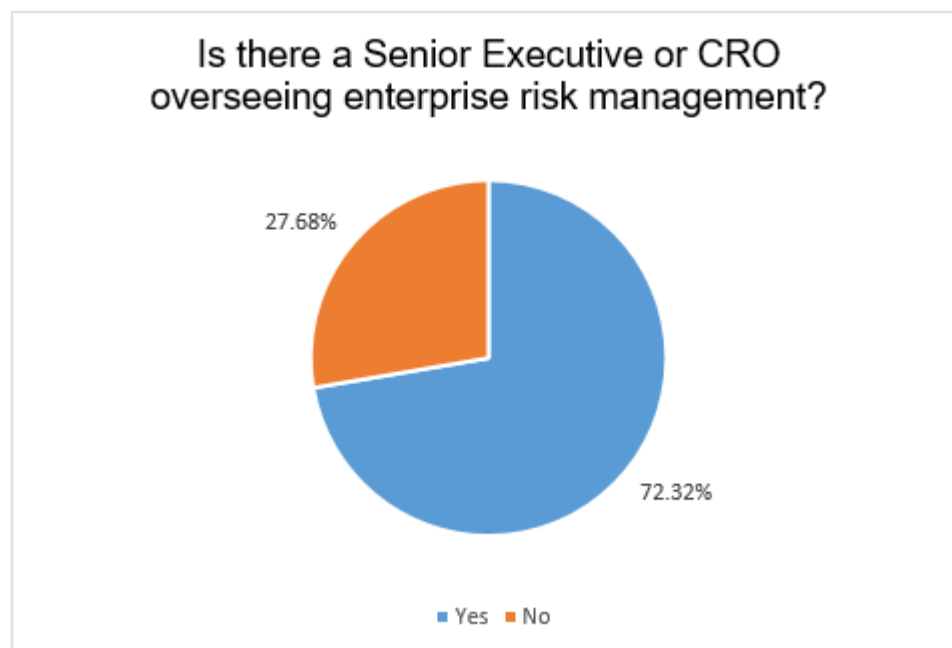
Figure 4. 7 Presence of Chief Risk Officer

4.4.2 ERM Leadership Reporting

On average, the CRO reports to more than two senior management bodies. Most respondents (37%) stated that the CRO reports to their Chief Financial Officer (CFO). These results are congruent with the seminal work of Dickinson (2001), where he argues that CRO must maintain a direct relationship with the CFO. This stems from the fact that CFOs are often responsible for the overall financial policy of the firm (see Duong and Evans, 2015, Ojeka et al., 2019), as well as the financial and non-financial risk management strategies (Ojeka et al., 2019). Next, a notable number (21%) of the respondents stated that their CRO reports to the Chief executive officer (CEO), followed by 17.65 % of respondent who indicated that their CRO reports directly to the board. A low 15.29% reports for the audit committee.

These figures show some consistency with Deloitte (2014) ERM survey which focused on the energy and resources sector all over the globe (see Figure 4.8).
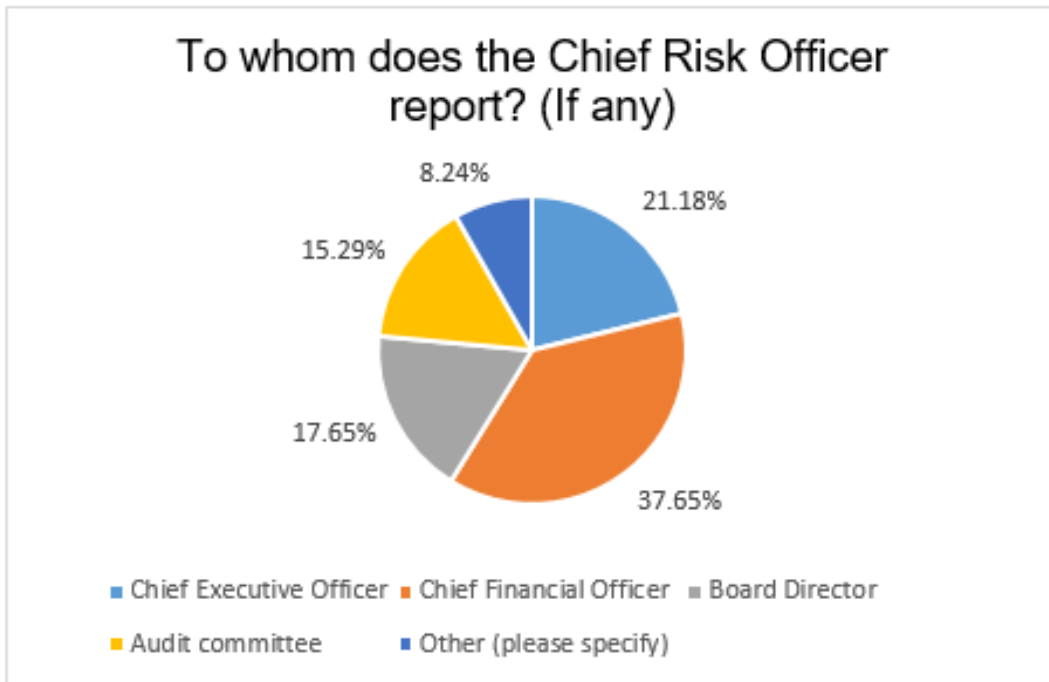
Figure 4. 8 ERM leadership reporting

4.4.3 Big Four Audit Firms and ERM
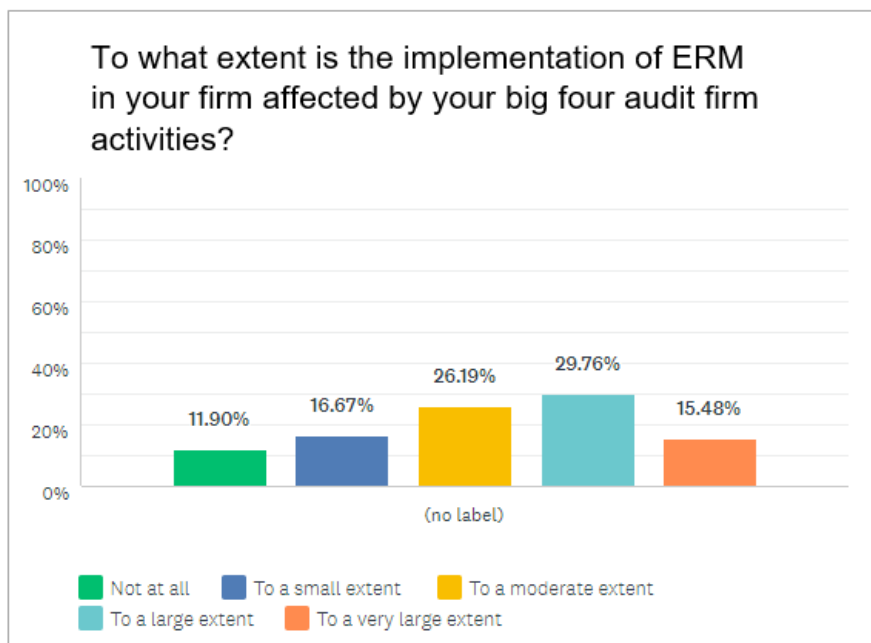
Figure 4. 9 Big four audit firms and ERM

In recent years, there has been a growing recognition of the vital links between the quality of

internal auditors and the presence of ERM in the firms (see Beasley et al., 2005; Golshan and

Rasid, 2012, Gatzert and Lechner, 2017). A considerable number of authors postulate that

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organisations which work with one of the largest accounting firms/internal auditors are more likely to engage in ERM activities. ERM proponents and industry professionals refer to these large auditing firms as big four auditors (KPMJ, Deloitte, PWC and EY). Correspondingly, in the North American energy and natural resources sector, 45.24% (The total of category 4 and 5 = 29.76% + 15.48%) of respondents stated that the implementation of their organisations' ERM programme was profoundly affected by the activities of their internal auditing firms (see figure 4.9). 26.19% claimed that their firms are moderately affected, followed by 16% who noted that they had been slightly affected. A minimal number of respondents (11.9%) reported that their big four auditing firm did not have any influence on the decision of ERM adoption in their organisation.

4.4.4 Big Four Internal Audit Firm's Activity

In 2004, the Institute of Internal Auditors (IIA) published a position paper outlining the following: 1. the key duties of internal audit concerning ERM, 2. the functions that an internal audit can legally conduct providing safeguards are in place, 3. the functions that they should not undertake (IIA, 2004b) (See table, 4.5).

In answering the question on the internal audit (IA) activities in different areas in the firms, only 15% of the respondent stated that their internal audit firm is extremely supporting their ERM leadership. In comparison, another 22.45% reported that their internal audit programme is very supportive for their firm ERM managers. Given that the IIA (2004a) clearly stated that "internal auditors should assist both management and the audit committee in their risk management responsibilities", these results are considered too low especially when compared to the respondents who stated that their IA are slightly engaged (13.27%) and those who stated that their IA is not involved at all in this process (21.43 %). It was also found that the internal auditors are extensively engaged in providing ERM training for 37% of the firms. Only 9.8%

of the respondents stated that their IA is slightly involved in ERM training, followed by almost one-quarter, who said that they do not receive any ERM training from them.
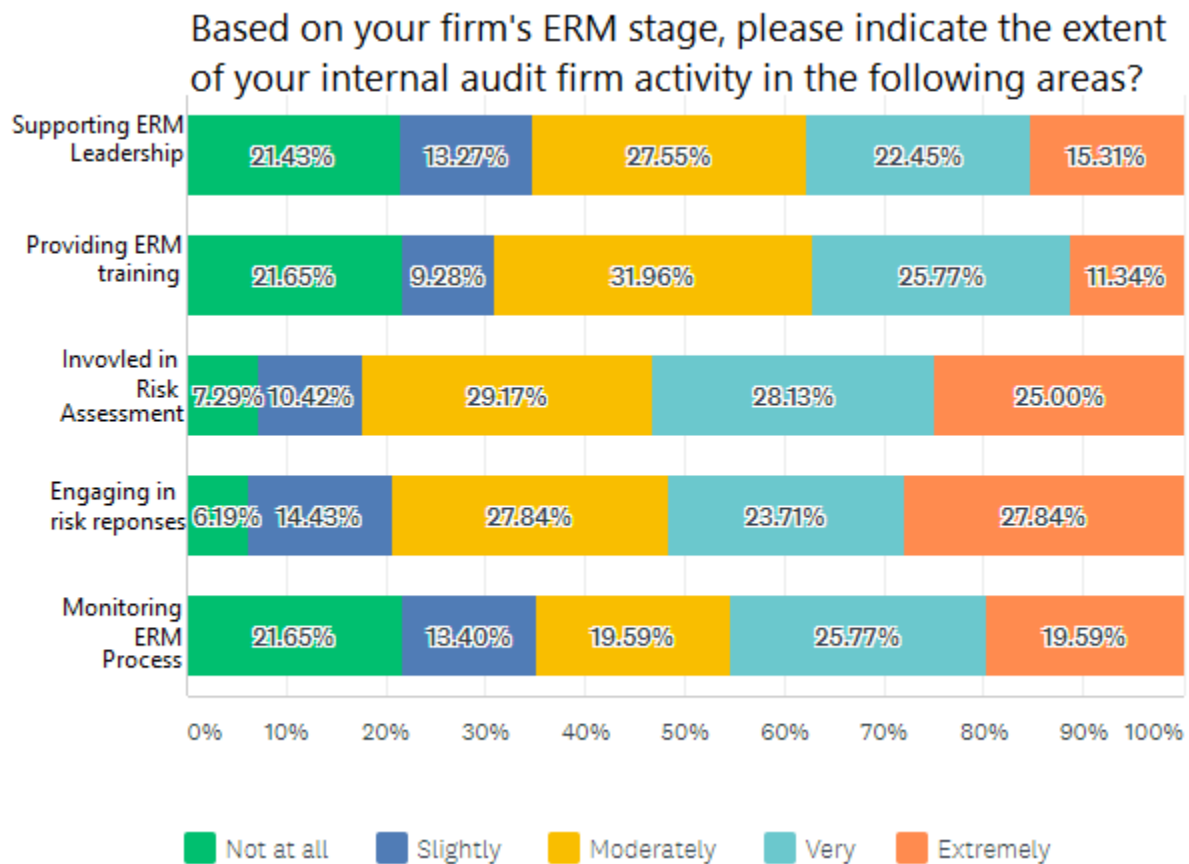
Figure 4. 10 Big four audit firm activities

Further, the survey also discovered that some internal auditors were involved in activities that the IIA had recommended as being unsuitable. As shown in figure 4.10, one-quarter of the respondents stated that their IA is involved in both risk assessment and risk responses. According to IIA (2004a), the IA should not engage in risk responding decision due to objectivity standards. What stands out more in figure 5.10 is that less than 10% of the respondents reported that IA is not supporting in risk assessment and risk responding.

In the last part of the question, figure 4.10 demonstrates that the IA is thoroughly involved in monitoring the ERM process in 45% of the firms. However, it moderately active in 19.59% of

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them and slightly active in 13.14% of others. Conversely, 21.65 % of the respondents stated that their IA firm activities do cover their ERM programme monitoring.

Table 4. 4 IIA: The Roles of Internal Audit

Core Internal Auditing Roles in ERM	1. Giving assurance on risk management processes 2. Giving assurance that risks are correctly evaluated 3. Evaluating risk management processes 4. Evaluating the reporting of risks
Legitimate internal auditing roles with safeguards	1. Reviewing the management of key risks 2. Facilitating identification and evaluation of risks 3. Coaching management in responding to risks 4. Coordinating ERM activities 5. Consolidating the reporting on risks 6. Maintaining and developing the ERM framework 7. Championing establishment of ERM 8. Developing a risk management strategy for board
Roles internal auditing should not undertake	1. Setting the risk appetite 2. Imposing risk management processes 3. Management assurance on risks 4. Taking decisions on risk responses 5. Implementing risk responses on management's 6. behalf 7. Accountability for risk management

Source: IIA (2004a); adopted from Subramaniam et al. (2011)

4.4.5 Primarily Driving Interest in ERM

In 2004, the Committee of Sponsoring Organizations of the Treadway Commission (COSO) stated that an effective ERM programme requires the active engagement of the firm's board of directors (COSO, 2004). In the same line, many ERM scholars argue that a successful ERM programme is highly reliant on the board commitment (Kleffner et al., 2003; Shenkir & Walker, 2006; Daud & Yazid, 2009; Muthuveloo et al., 2015). Interestingly, the results of this survey

are correspondent with the literature, where more than half of the participants (55%) chose the board of directors as a primary driver of their firms' ERM programme.
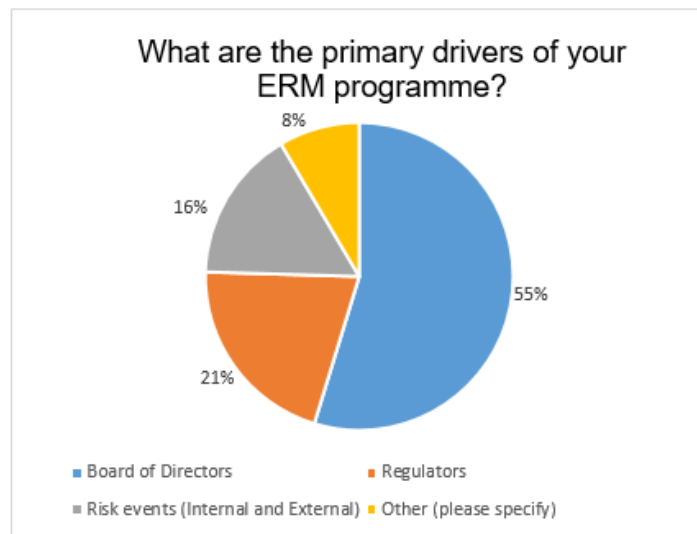
Figure 4. 11 Primary drivers of ERM

The other key driver of ERM adoption is regulators (21%). After the 2008 financial crisis, many stock exchanges and regulatory bodies started increasing their pressure on public listed companies to set up an ERM programme. A Different perspective on this was 16% of the respondents who saw that the primary reason behind their organisations' decision in implementing ERM is the economic uncertainty and daily evolving risk events.

4.4.6 ERM Risk Culture
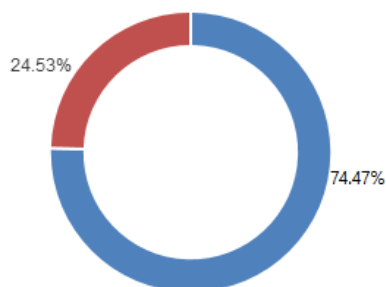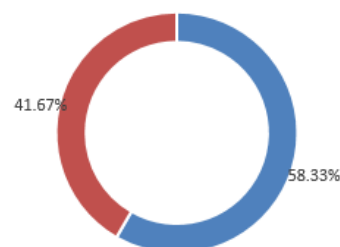
Figure 4. 12 Risk Culture and ERM

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Given that ERM has positive implications for organisations and it intends to support them at all levels (corporate, business and functional), particularly in times of uncertainty (see Kimbrough and Componation, 2015), it would be expected that the organisation culture has an essential influence on its implementation decision. Therefore it is worthwhile to examine the effect of the organisational culture on ERM implementation process in this study. Figure 4.12 shows the survey participant's responses to the two question regarding their organisational culture's effect on ERM implementation effectiveness and speed. In both questions, the respondents who stated that their organisational culture was supportive were higher than those who claimed their culture was an obstacle. Nevertheless, the percentage of respondents who saw that their culture slowed down their ERM programme implementation is high (41.67%).

5.4.8 ERM training
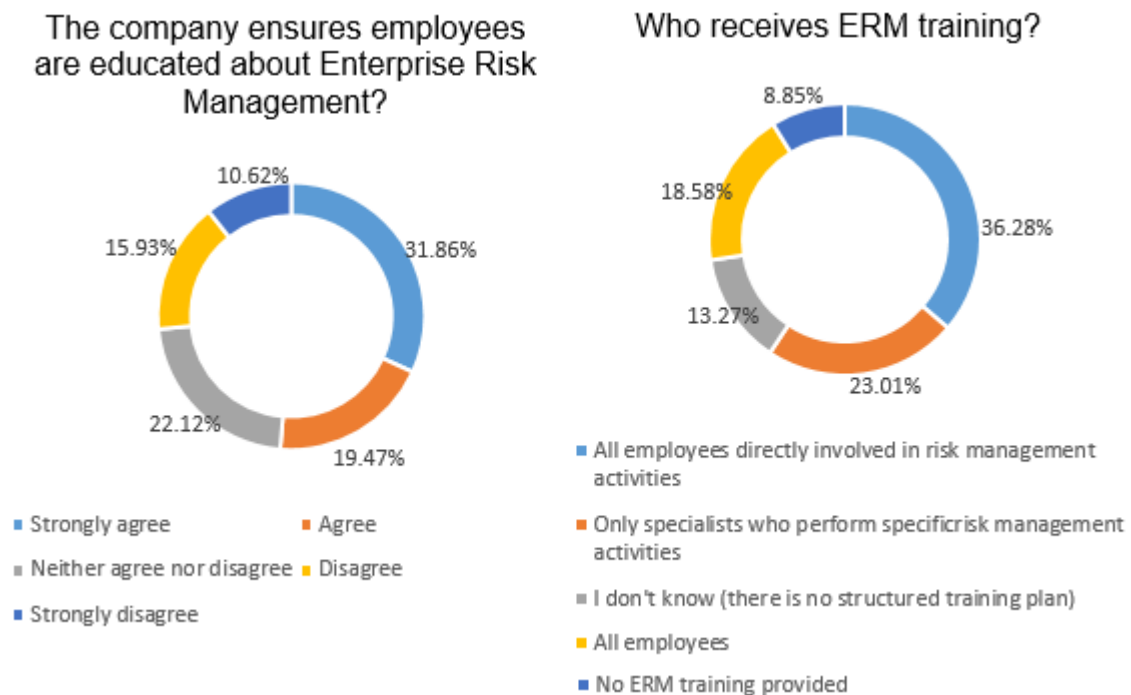
Figure 4. 13 ERM training

Despite the importance of employee training in the creation of a risk-aware culture in the organisation, roughly one-quarter of the survey participants do not have an ERM training

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programme in place. Approximately 50% of the respondents indicated that their firms are conducting ERM training for employees. Of those, the highest number (36%) prioritise training their employees who are mainly engaged in risk management practices (see figure, 4.13). At the same time, 23% of the respondents stated that their organisations focus their training programmes merely on specialists who perform specific risk management activities. Few participants (18%) reported that their organisation are providing training to all the employees.

4.5 Summary

ERM programme is still in its early stages in the North American energy and natural resources sectors. The survey showed that a large number of firms in this sector have some form of ERM programme (64%); however many firms are not practising any ERM functions till now (36%). A considerable number of these firms that did not adopt the programme indicated that the main reason is that it is not high on the agenda of their board and other senior management bodies. Even those who stated that they have an upper ERM stage, most of them implemented the programme only 4 to 6 years ago (43%). These results could be due to the lack of empirical evidence on the effect of ERM on firm value in this sector or because of the paucity of evidence about the influential factors which lead to ERM successful implementation.

The ten years following the 2008 financial crisis have seen an increased interest from the organisation's board of directors and many regulatory bodies in ERM programme. This is clearly evident in the survey responses, where a large number of the survey participants indicated that board of directors are the primary driver of ERM adoption by their firms (55%), followed by regulators (21%). Nevertheless enhancing the effectiveness of ERM and its successful implementation does not merely happen in the strategic level of the firms, it is deeper within organisations. It might be supposed that raising risk awareness by creating an organisational culture framework suitable for ERM deployment could accelerate the

implementation process. A first step may be educating all the firm employee about ERM or at least all employee at the corporate and business level. In this study, there appears to be no ERM training programme in more than one-quarter of the firms who participated in this survey (see figure 5.11). Further, most of the firms that are providing ERM training are mainly focusing on employees who are directly involved in risk management activities. Another important ERM driver is the presence of a Big four internal auditor in the firms. Around 45% of the respondents in this survey stated that the deployment of their ERM programme is profoundly affected by their big four audit firm activities. These findings prove that the quality of the organisations' internal audit has a significant influence on their ERM stage and its effectiveness.

Finally, the survey results revealed that the overwhelming majority (72%) of the firms that have an ERM programme in place had appointed a senior executive or a chief risk officer for overseeing their ERM programme. This may be interpreted as more firms started seeing the value of ERM and have therefore created a specialised position to be in charge of this area.

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Chapter Five
Data Analysis

5.1 Introduction

During the last decade, the effect of ERM on firm value has been at the centre of much attention. This is due to the increased uncertainty in the business environment, which is hindering organisations' performance in different regions. This rapid change in the global economy led to a growing interest in ERM by many rating agencies, regulators and governments. Nevertheless, clear evidence on the determinants of ERM implementation and its effect on firm value still lacks in the literature, especially in the energy and natural resources sector. Consequently, the development of ERM has been prolonged, and the programme is still at an immature level. This study aims to fill this gap in the knowledge of ERM. Unlike the majority of ERM scholars who mainly relied on secondary sources for identifying the state of ERM in the firms, this study used both secondary and primary data. In doing so, a survey has been sent to all the North American energy and natural resources listed companies, followed by a secondary data collection from the firm's annual reports and financial databases. In this chapter, the survey data were coded and entered in IBM SPSS along with the control variables. Similar to the seminal work of Beasley et al. (2005), this study transformed most of the survey items into dummy variables. The variables types, definitions and their expected relationship with the dependent variable are also presented later in this chapter.

This chapter is structured as follow. The first section mainly discusses the effect of ERM on firm value. It includes univariate descriptive statistics, Pearson correlation coefficient, and the stepwise-multiple-regression analysis. The second section examines the main determinants of ERM implementation. The section also includes descriptive statistics of ERM determinants, a Pearson correlation coefficient analysis, and an ordinal logistic regression. The last section is the chapter conclusion

5.2 Validating the Sufficiency of Data

Before starting the data analysis, the research data were assessed to ensure that they are suitable for a stepwise-multiple regression and an ordinal logistic regression. The steps followed are listed below:

5.2.1 Categorising Survey Responses

The principal question in the survey is about the extent of ERM implementation in the participants' organisations. The question is a 5 points Likert scale in which the survey participants were asked to rate the level of ERM deployment in their firms from 1 to 5. Before performing the data analysis on IBM SPSS 24, ERM stage variable was converted to numerical values and entered to the software as a 5 points ordinal scale variable. However, the survey items related to CRO, big four auditing firms, the board of directors monitoring and risk culture where all converted to dummy variables (from 0 to 1). A detailed variables description is available in table 5.1

5.2.2 Testing the Reliability of the Survey Instrument:

Given that testing the reliability of the survey instrument is essential for ensuring the measurement accuracy of its items, Cronbach's alpha has been used for this purpose. The main objective of using Cronbach's alpha in this study was to assess the consistency of the participants' answers about the extent of ERM deployment (ERM STAGE) in their firms. The result of Cronbach's alpha for the tested survey items is 0.863 which is deemed an adequate reliability result (see table 3.14 in Chapter 3) see also (Cicchetti and Sparrow, 1990; Peterson, 1994).

5.3 Section One: Results of ERM and Firm Value
5.3.1 Description of ERM and Firm Value Variables

This study examines the relationship between ERM and firm value after controlling for several variables that have been used by many authors in previous ERM studies. The data on ERM

stage were collected using a survey instrument that has been sent to all the North American energy and natural resources listed companies. The firm value measure which has been adopted in this study is Tobin's Q. The dependent variable (Tobin's Q) and all the control variables of the ERM and firm value model were collected from the company's annual reports and financial databases. The variables' definition and their expected relationship with firm value are provided in Table 5.1. The assumption equation is a linear model that can be tested using an Ordinal Least Squares (OLS) regression.

Table 5. 1 ERM and Firm Performance Variables

Variable Name	Expected sign	Definition	Data source
Dependent Variable: Firm Value Measurement			
Tobin's Q		The market value of equity + Book value of liabilities/ Book value of total assets	Y-Charts and ADVFN
Independent Variable			
ERM Stage	+/-	Ordinal Scales rated from 1 to 5	An online survey sent to all the 392 North American energy and natural resources firms.
Control Variables			
Firm Size	+	The natural logarithm of total assets	Y-Charts
Leverage	-	Total debt/Total equity	Y-Charts Morning-star
ROA	+	Net income / total assets	Y-Charts
Dividends	+	Dummy variable = 1 if the company paid a dividend in the year t or = 0 if not	Y-Charts
Sales Growth	+	(Current Period Net Sales - Prior Period Net Sales) / Prior Period Net Sales * 100	Y-Charts

Note: ERM = Enterprise Risk Management; ROA= Return on Assets. This Table provides the definition and the expected sign for each variable. Accounting data, such as total assets, are measured at the end of 2018. The average data is the average of the value on the end of 2017

and the value end of 2018, while the data in the income statement is measured over the period from the end of 2017 to the end of 2018.

5.3.2 Descriptive Statistics Categorised by ERM Stage

Table 5. 2 ERM and Firm Value Descriptive Statistic

ERM STAGE	No. of firms	Tobin 's-Q	Firm size	ROA	LEV1	Growth	DIV	
	Count	Mean	Mean	Mean	Mean	Mean	Count (0)	Count (1)
1	10	.65	21.22	.31	.89	.38	17	14
2	14	.82	21.11	.42	.64	.48	27	18
3	19	.99	23.64	.22	.77	.58	8	10
4	45	1.06	23.65	.35	1.44	.59	3	11
5	31	1.24	23.71	.37	.33	.59	2	9

Note: ERM = Enterprise Risk Management. This table provides the mean value for the variables of all energy and natural resources firms in each ERM Stage category. All variable definition is provided in Table 5.1.

Descriptive statistics categorised by ERM stage (from 1 to 5) are shown in table 5.2. The table includes all the mean values of all variables in the ERM and firm value equation for each ERM stage category. The table shows that the expected relationship between ERM and firm value as well as the relationship between the control variables and firm value, match this study hypothesis. It is clearly noticeable that Tobin's Q is increasing steadily as the ERM stage increases. This indicates a clear positive relationship between a higher ERM stage and firm value (Tobin's Q). Similarly, there is a roughly positive relationship between firm size and ERM stage, and larger firms seem associated with higher firm value. ROA appears to be the highest at ERM stage 2, which could be a consequence of a potential outlier in the variable.

Further, the relationship between leverage and ERM stage is not clear, although it seems to be the lowest at ERM stage 5. This could be clarified in the upcoming analysis. All other variables (Dividend and Sales Growth seems positively related to ERM stage.

5.3.3 Pearson Correlation Coefficient of ERM and Firm Value

Table 5. 3 Pearson Correlation Coefficient of ERM and Firm Value Model

		Tobin's-Q	ERM	Size	ROA	LEV1	Growth	DIV
Correlations								
Tobins_Q	Pearson Correlation	1						
	Sig. (2-tailed)							
ERMSTAGE	Pearson Correlation	.452**	1					
	Sig. (2-tailed)	.000						
Firm Size	Pearson Correlation	.560**	.340**	1				
	Sig. (2-tailed)	.000	.000					
ROA	Pearson Correlation	.195*	.038	.140	1			
	Sig. (2-tailed)	.033	.678	.130				
LEV1	Pearson Correlation	-.325**	-.137	-.284**	-.177	1		
	Sig. (2-tailed)	.000	.138	.002	.054			
Growth	Pearson Correlation	.563**	.242**	.427**	-.086	-.110	1	
	Sig. (2-tailed)	.000	.008	.000	.352	.235		
DIV	Pearson Correlation	.260**	.135	.384**	.159	-.304**	.096	1
	Sig. (2-tailed)	.004	.143	.000	.085	.001	.301	

Note: ERM= Enterprise Risk Management; Tobin's Q= firm value; ROA is the return on assets; Lev1 is Leverage; Growth is Sales Growth; DIV is the dividend paid at the end of the year 2018. ****.** Correlation is significant at the 0.01 level (2-tailed) and *. Correlation is significant at the 0.05 level (2-tailed).

Table 5.3 shows the Pearson correlation coefficient of ERM and firm value model. The correlation between ERM and firm value is as previously expected (significant at 1%).

Likewise, the correlation between most of the control variables and Tobin's Q is significant at 1%, apart from ROE which is significant and 5% (correlation= 0.26). Considering that there is a high correlation between some control variables which could indicate multicollinearity, the variance inflation factor (VIF) developed by Belsley, Kuh, and Welsch (1980) has been computed. Further Stepwise regression has used been as an alternative of OLS, in order to get the best model among the variables and reduce multicollinearity effect. VIF results are explained with the regression results below.

5.3.4 ERM and Firm Value – Stepwise Regression

While the majority of previous studies mainly relied on linear regression analysis to examine the relationship between ERM and firm value (Beasley et al., 2008; McShane et al., 2015; Agustina et al., 2016; Abdullah et al., 2017; Silva et al. 2019, Bohnert et al., 2019), this research primarily uses Stepwise regression. Stepwise regression is usually employed to find the most effective group of independent variables, as well as the best model fit. It builds the model in sequential steps, where independent or control variables can be added or deleted at each step (see Beale, 1970; Hengl et al., 2004; Al-Jarrah et al., 2017). Given the likelihood of multicollinearity between ERM stage and few control variables (see table 5.3), using Stepwise regression and VIF will help in overcoming this issue (Chong, 2005) (see also, Khikmah et al., 2017). The analysis output will present only statistically significant predictors. In this study, the last model in the regression output is only interpreted because it contains all the significant predictors.

Table 5.4 shows the model summary (R, R square and Adjusted R square) and Table 5.5 shows the results of the stepwise regression analysis. The ERM stage and firm value linear model is as follows:

$$\textbf{Tobin's Q} = \beta_0 + \beta_1 ERM\ STAGE + \beta_2 SIZE + \beta_3 \text{LEVERAGE} + \beta_4 ROA + \beta_5 DIV + \beta_6 GROWTH$$

As displayed in table 5.4, the multiple r (R) of the full model (model 4) indicates a strong correlation between the independent variables and the dependent variable (Tobin's' Q). Similarly, the adjusted R square is 0.523 (52%), which indicates a high level of accuracy in the model (goodness of fit).

Table 5. 4 Model Summary

			Model summary	
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.563[a]	.317	.311	.41330
2	.665[b]	.442	.432	.37502
3	.707[c]	.499	.486	.35679
4	.734[d]	.539	.523	.34372

Table 5. 5 Stepwise Regression Model

		Coefficients						
		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	.521	.071		7.304	.000		
	Sales_Growth	.856	.116	.563	7.362	.000	1.000	1.000
2	(Constant)	-.698	.247		-2.824	.006		
	Sales_Growth	.602	.117	.396	5.159	.000	.818	1.222
	Firm_size	.060	.012	.392	5.109	.000	.818	1.222
3	(Constant)	-.673	.235		-2.857	.005		
	Sales_Growth	.556	.112	.365	4.973	.000	.807	1.239
	Firm_size	.048	.012	.318	4.194	.000	.759	1.318
	ERMSTAGE	.081	.022	.256	3.627	.000	.873	1.146
4	(Constant)	-.653	.227		-2.881	.005		
	Sales_Growth	.634	.111	.417	5.740	.000	.766	1.305
	Firm_size	.041	.011	.268	3.588	.000	.725	1.380
	ERMSTAGE	.080	.022	.253	3.712	.000	.873	1.146
	ROA	.370	.117	.208	3.149	.002	.930	1.075

a. Dependent Variable: Tobins_Q

Table 5.5 provides the Stepwise regression results which automatically selected the predictors that are significantly related to the dependent variable Tobin's Q. Four predictors out of six have been selected by the regression model including ERM stage. From table 5.5, it can be seen that the highest correlation in the model is between Sales_Growth and firm value (Beta= 0.417) with a P-value of 0.000. ERM stage is also positive and significantly related to Tobin's Q with a P-value of 0.000). Further, the control variable: firm size and ROA are found to be significantly related to firm value with P-values of 0.000 and 0.002, respectively. The largest Variance Inflation factor (VIF) in the model variables is 1.305 for Sales_Growth, which indicates that there are no multicollinearity issues. What stands out in the table is the absence of Dividend (DIV) and Leverage (LEV1), although the study expected that they are significantly associated with firm value. According to the Pearson product correlation coefficient in table 5.3, both DIV and Leverage is significantly related to firm value. Thus another regression has been conducted alternately omitting Sales_Growth from the equation. The significance of DIV does not change, but LEV1 becomes negatively significant at a P-value of 5%.

In summary, the results presented above show that the stage of ERM implementation in the North American energy and natural resources companies has a significant positive relationship with their firm value. In other words, a higher ERM stage leads to higher firm value in this sector. The control variables: Sales_Growth, ROA and firm size are significantly positively related to firm value. Leverage is negatively related to firm value, and unexpectedly dividend is not significantly associated with firm value.

5.4 Section Two: Results on the Determinants of ERM Adoption

This section will examine the determinants of ERM successful implementation in the North American energy and natural recourses sector. In doing so, the following ordinal logistic regression model is used:

ERM stage $= f$ [SIZE, LEV, CRO, BIG4AUDIT, BOD, RCULTURE, GROWTH, INST]

The definition of the variables in the equation above, as well as their expected relationship with the dependent variable (ERM stage), is presented in Table 5.6.

Table 5. 6 ERM Determinants Variables

Variable Name	Expected sign	Definition	Data source
Dependent Variable: ERM Stage			
ERM Stage		Ordinal Scales rated from 1 to 5	An online survey sent to all the 392 North American energy and natural resources firms.
Predictor variables			
Firm Size	+	The natural logarithm of total assets	Y-Charts
Leverage	-	Total debt/Total equity	Y-Charts Morning-star
CRO	+	CRO is a dummy variable = 1 if the firm has a CRO position. Otherwise = 0.	Online survey questionnaire
Institutions	+	Amount of shares owned by institutions	Y-Charts
Big four auditing firm (KPMG, EY, Deloitte or PricewaterhouseCoopers)	+	BOD is a dummy variable =1 if the firm BOD influence ERM decision and =0 otherwise	Online survey questionnaire

Note: ERM is enterprise risk management.

Table 5. 6 ERM Determinants Variables (Continued)

Variable Name	Expected sign	Definition	Data source
Board of directors monitoring	+	BOD is a dummy variable =1 if the firm BOD influence ERM decision and =0 otherwise	Online survey questionnaire
Sale Growth	+	(Current Period Net Sales - Prior Period Net Sales) / Prior Period Net Sales * 100	Income statements taken from annual reports
Risk Culture	+	Is a dummy variable= 1 if the company culture support ERM implementation and =0 otherwise.	Online survey questionnaire

Note: ERM is enterprise risk management.

5.4.1 ERM Determinants Descriptive Statistics Categorised by ERM Stage

Table 5.7 provides the univariate statistics on the variables of the determinants of ERM model, categorised by ERM stage. It presents the mean value of each predictor according to its ERM stages category. As can been seen in table 5.7, more than half of the North American energy and natural resources listed firms who participated in the survey have an ERM programme in place (ERM stage 4 and ERM stage 5). In comparison, only 36 % (n= 43) of the firms are still undertaking traditional risk management activities. Closer inspection of the table shows that most of the independent variables related to ERM stage 5 have the highest mean values compared to the other four categories (firm size, sales growth, CRO, the board of directors monitoring, big four audit firms and risk culture) as previously predicted (see table 5.6). On the other hand, the variable leverage and unexpectedly, institutional ownership seem to have the highest score at ERM stage one. A further statistical test could clarify these results.

Table 5. 7 ERM Determinants Descriptive Statistics Categorised by ERM Stage

ERM Stage	Firm size	Growth	LEV1	Institutional Ownership	CRO	Big4	BOD	Culture
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
1 (n=10)	21.22	.38	.89	.25	.18	.46	.43	.61
2 (n= 14)	20.11	.48	.64	.23	.20	.50	.55	.75
3 (n= 19)	23.64	.58	.77	.22	.80	.87	.80	.93
4 (n= 45)	23.65	.59	1.44	.16	.86	.95	.90	.67
5 (n= 31)	23.71	.59	.33	.20	.89	.80	.89	.86

Note: ERM = Enterprise Risk Management; LEV1= Leverage; BOD= Board of directors monitoring; Culture= Risk Culture; Big4= The Big Four Audit Firms; CRO= Chief Risk Officer; Growth= Sales Growth.

5.4.2 Pearson Correlation Coefficients of the Determinants of ERM Model

The results of Pearson correlation coefficient analysis are set out in Table 5.8. The relationship between the majority of ERM determinants and ERM stage is as expected. Risk culture is significant at 10%, which is somewhat counterintuitive. No statistically significant correlation was found between Leverage and ERM stage. Similarly, the relationship between Institutional ownership and ERM stage is not statistically significant. Generally, the correlation between the predictors is not high, which indicates no multicollinearity problems.

Table 5. 8 Pearson Correlation Coefficients of ERM Determinants Model

		ERM_STAGE	Firm-size	LEV1	Growth	CRO	Big4	BOD	Inst	Culture
ERMSTAGE	Pearson Correlation	1								
	Sig. (2-tailed)									
Firmsize	Pearson Correlation	.340**	1							
	Sig. (2-tailed)	.000								
LEV1	Pearson Correlation	-.137	-.284**	1						
	Sig. (2-tailed)	.138	.002							
Sales_Growth	Pearson Correlation	.242**	.427**	-.110	1					
	Sig. (2-tailed)	.008	.000	.235						
CRO	Pearson Correlation	.624**	.323**	.011	.301**	1				
	Sig. (2-tailed)	.000	.000	.906	.001					
Big4	Pearson Correlation	.347**	.371**	-.057	.257**	.322**	1			
	Sig. (2-tailed)	.000	.000	.539	.005	.000				
BOD	Pearson Correlation	.420**	.298**	-.100	.222*	.227*	.449**	1		
	Sig. (2-tailed)	.000	.001	.279	.015	.013	.000			
Institutions	Pearson Correlation	-.089	-.036	.005	-.131	-.080	-.094	-.176	1	
	Sig. (2-tailed)	.338	.697	.956	.155	.389	.310	.056		
Culture	Pearson Correlation	.171	.109	.101	-.029	.042	.106	.074	.007	1
	Sig. (2-tailed)	.063	.239	.276	.757	.649	.251	.422	.940	

Note: ERM = Enterprise Risk Management; LEV1= Leverage; BOD= Board of directors monitoring; Culture= Risk Culture; Big4= The Big Four Audit Firms; CRO=Chief Risk Officer; Growth= Sales Growth; Inst= Institutional ownership. This table provides the Pearson correlation coefficient value for the variables of all energy and natural resources firms. All the variables definition are provided in Table 5.1

5.4.3 Ordinal Logistic Regression – The Determinants of ERM Model

Table 5. 9 Ordinal logistic regression

		Expected sign	Estimate (B)	Std. Error	Wald	df	Sig.
Threshold	[ERMSTAGE = 1.00]		1.685	1.553	1.178	1	.278
	[ERMSTAGE = 2.00]		3.099	1.572	3.887	1	.049
	[ERMSTAGE = 3.00]		4.034	1.591	6.433	1	.011
	[ERMSTAGE = 4.00]		5.184	1.614	10.317	1	.001
Location	Firm_size	+	.017	.073	.051	1	.821
	Sales_Growth	+	-.177	.637	.077	1	.782
	Leverage	-	-.531	.242	4.823	1	.028*
	Institutions	+	.160	.569	.079	1	.778
	CRO	+	2.863	.457	39.341	1	.000**
	Risk_Culture	+	.944	.424	4.956	1	.026*
	Big4	+	.134	.460	.086	1	.770
	BOD	+	1.697	.463	13.432	1	.000**

Pseudo R-Square: 0.431

Model Chi-Square (8 df) = 80.367, P= 0.000. For variables definitions: see table 5.6.

As described in Chapter 3, in order to investigate the determinants of ERM implementation in the sample of 119 North American energy and natural resources firms, an ordinal logistic regression analysis has been used. The results are shown in Table 5.9. As can be seen, the overall model has a Chi Square= 80.367 with a p-value of 0.000 which means that the explanatory power of the model is significant. Further, the Pseudo R-Square of the model is 43%, which also indicates a good model fitting.

The higher ERM deployment stage is positively related to Risk Culture with a significance level of 5% (p-value= 0.026). This indicates that firms which have a higher level of risk awareness and effective risk culture have a more advanced ERM programme in place. Likewise, the positive and significant relationship between CRO and ERM stage (p-value

0.000) suggests that firms which have a CRO position have a higher propensity to implement an effective ERM programme. In the same vein, there is a significant positive relationship between the board of director monitoring and ERM stage. Alternatively, Leverage reported a significant negative relation with ERM stage (coefficient= -.531 and p-value= 0.28).

The study also considered the effect of other variables (firm size, institutional ownership, sale growth and big four audit firms) that are expected to influence ERM implementation stage. None of these variables was statistically significant.

5.5 Summary

The main objective of this study is to examine the effect of ERM adoption on firm value and to discover the key determinants of ERM implementation in the North American energy and natural resources firms. In order to achieve these two objectives, two econometric equation was developed. Also, a survey has been employed for collecting data on the current state of ERM in the targeted sample, which was followed by a secondary data collection from annual reports and financial databases. Thus, this chapter presented the data analysis and the key finding of the study.

The first section of this chapter mainly focused on ERM stage and firm value equation. A descriptive statistics of both the independent variables and the dependent variables of the equation, categorised by ERM stage are presented. Further, the definition of each predictor variable is provided with its expected relationship with the dependent variable (firm value). Pearson correlation coefficient has been used to analyse the correlation among variables. In addition, VIF has been computed to ensure that there are no multicollinearity problems. While the initial plan was to use OLS regression model for examining the effect of ERM on firm value, the Stepwise regression analysis has been used due to the high correlations which were discovered between some of the predictor variables. A significant positive relationship was

found between ERM stage and firm value. Similarly, the control variables: firm size, sale growth and ROA were all significantly and positively related to firm value. Other variables (Leverage, Dividends) showed non-significant statistical results.

The second section included the data analysis of the determinants of ERM implementation. The section started by providing the descriptive statistic of ERM determinants model, categorised by the five stages of ERM. Next, a Pearson correlation analysis has been provided to assess the correlation between variable. Finally, Ordinal logistic regression has been used to identify the determinant, which may influence ERM implementation in the firms. It was found that CRO, the board of directors monitoring and risk culture are positively associated with a higher stage of ERM implementation.

In contrast, leverage reported a significant negative relationship with ERM implementation. Results on Big4, institutional ownership, sales growth and firms size showed a non-statistically significance with ERM implementation stage. Further analysis and discussion of results will be provided in the next chapter.

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Chapter Six

Discussion and Implications of the Results

6.1 Introduction, Research Questions and Hypothesis

Enterprise Risk Management has received unusual interest and global attention in the last decade. This is due to the increased uncertainty in the corporate world, which is affecting the performance of many firms negatively, especially those in the energy and natural resources sector. Despite the growing number of publications around this topic, yet the vast majority of studies mainly focused on the financial services industry. Hence, this could leave firms in other sectors unclear about the value of investing in an ERM programme. In addition, the development of ERM could be hindered due to the lack of a clear understanding of the firm characteristics that influence its implementation success. Another significant limitation in ERM studies is the reliance on secondary data for identifying ERM current state. Using this method lacks the capability of measuring the level of ERM implementation in the firms. This study aims to fill the gap in the literature by addressing the following research questions:

1. What is the current stage of ERM implementation in the North American energy and natural resources sector?

2. Does the implementation of ERM in the energy and natural resources firms affect their firm value positively?

3. What are the firm's characteristics associated with a successful ERM implementation in the North American energy and natural resources sector?

4. Does the organisations' risk culture significantly influence the level of ERM deployment in the firms?

In order to address the above research questions, an online survey has been sent to all the North American energy and natural resources listed companies (N= 392), followed by secondary data

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collected from annual reports and financial databases. The previous chapter reported the results of the analyses of the survey data and the secondary data. Hence, this chapter discusses these results against the previous studies in the literature. Table 6.1 presents the hypothesis of the study and the results of the hypothesis testing.

Table 6.1 Hypothesis Testing Results

Hypothesis	Expected Sign	Results
H1: The implementation of an enterprise risk management programme has a positive and significant relationship with firm value.	+	Supported
H2: There is a significant positive relationship between firm size and firm value.	+	Supported
H3: There is a significant negative relationship between leverage and firm value.	-	Rejected
H4: There is a significant positive relationship between ROA and firm value.	+	Supported
H5: Firms that pay dividends for shareholders are more likely to have a higher firm value.	+	Rejected
H6: Sales growth is expected to have a significant positive relationship with firm value.	+	Supported
H7: The presence of the CRO role has a significant relationship with ERM implementation.	+	Supported
H8: The presence of a big four auditing firm has a significant positive relationship with ERM implementation.	+	Rejected
H9: Board of directors monitoring has a significant positive relationship with ERM implementation.	+	Supported
H10: Firms that have a high percentage of institutional ownership are more likely to implement an ERM programme	+	Rejected
H11: Larger firms are more likely to implement an ERM programme.	+	Rejected
H12: A firm with high sales growth are more likely to implement an ERM programme.	+	Rejected
H13: Highly leveraged firms are more likely to implement an ERM programme.	+	Rejected
H14: Risk Culture has a positive and significant relationship with an upper ERM stage.	+	Supported

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In this chapter, each hypothesis is individually evaluated and compared to the study findings and previous ERM research. Also, the implications of each result are discussed and critically analysed.

This chapter is divided into four main sections. The first section discusses the current state of ERM in the North American energy and natural resources listed companies. Section two presents the discussion of the results corresponding to the effect of ERM on firm value model. The third section discusses the study results on the determinants that influence ERM implementation in the firms and their implications. The fourth sections discuss the results of the influence of risk culture on ERM implementation success. Finally, the chapter conclusion.

6.2 The Current State of ERM in the Energy and Natural Resources Sector

As discussed before there is a paucity of information about the current state of ERM in the North American energy and natural resources sector. In addition, there is a lack of a reliable measure for ERM implementation level in the firms. In order to fill this gap in the literature, this study set out the first objective as follow:

1. To measure the level of ERM implementation in the North American energy and natural resources publicly traded companies.

To achieve this objective, this study employed an online survey tool which has been sent to all the North America energy and natural resources firms listed in New York stock exchange and Nasdaq using an ordinal scales for examining ERM implementation level in the firms. The ordinal scales of ERM measure has been adopted from the seminal work of Beasley et al., (2005). The results of the survey were reported in chapter four, and the following section provides a discussion of the survey results and their implications.

Analysis and Implications:

This study employed a survey tool to measure ERM implementation directly from the North American energy and natural resources listed companies. The survey item responsible for measuring ERM implementation has been adopted from the seminal work of Beasley et al. (2005). This approach has a distinct advantage over the approaches used in previous studies, which have relied on secondary data such as proxies or accounting factors.

The results and analysis of the survey data are provided in Chapter 5 of this thesis. As presented in Chapter 5, the vast majority of the respondents stated that they have an ERM programme in places (64%; N= 76). Around one-quarter of the respondents who have an ERM programme stated that their ERM programme is at a complete level, while 38% of them stated that it is partially implemented. On the other hand, 36% of the survey participants reported that their organisations do not have an ERM programme in place. 16% of these organisations are planning to implement an ERM, 12% of them are still investigating ERM, but they did not decide to implement it yet, and 8% have no plans to implement it at all. Due to the lack of ERM studies targeting the energy and natural resources sectors in North America, it is hard to compare the results on the current state of ERM of this study with other studies in the literature. Only one study has been identified in the literature, which mainly focuses on the North American energy sector. The study was conducted by Walker (2015), where he surveyed a sample of 100 North American energy companies to examine their current state of ERM. Although his study provided great insight into ERM in the sector as well as the main risks facing the industry, yet his findings lack clarity regarding ERM implementation level. Apart from the energy and natural resources sector, the results of the survey accord with the findings of other scholars who investigated the current state of ERM in the US. For instance, Beasley et al., (2014) conducted a study in association with the American Institute of Certified Public Accountants (AICPA) to examine the current state of ERM in different types of firms. Using

an online survey which has been sent to all the members of AICPA, they found that 24% of the respondents have a complete ERM programme in their firms. In 2017, they conducted a similar survey, and they found a small increase in the number of firms that have a complete ERM programme in place (28%) (Beasley et al., 2017).

The findings on the current state of ERM in the North American energy and natural resources sector suggests that there is room for improvement in their ERM implementation. The current literature on ERM suggests that implementing a robust ERM programme is associated with many factors such as financial costs, human costs, the establishment of CRO position in the firm and the development of risk culture all over the organisations (see, e. g., Hoyt and Liebenberg 2011; Farrell and Gallagher 2015; Bohnert et al. 2017). Therefore, companies in the energy and natural resources industry should consider increasing the budget for ERM maintenance and development. In addition, instead of holding ERM responsibility merely at senior management level (C-Suite) of their firms, they should consider developing a risk culture where all the employees at all levels have a common understanding of the risk and compliance policies as they work toward business objectives.

Further, the survey results of this study indicated that there is a high likelihood that a large number of firms still depend on traditional risk management and hedging activities in their business process. Given that many studies on hedging activities in the literature showed that this types of traditional risk management activities incur organisations high costs (Aabo et al., 2005), does not decrease risk exposure and does not increase firm value (Jin and Jorion, 2006), companies should stop hedging their risks aggressively.

6.3 The Effect of ERM Implementation on Firm Value:

The second objective of this study addresses the effect of ERM on firm value presented as follow:

2. To investigate the effect of the adoption of enterprise risk management on firm value in the North American energy and natural resources publicly traded companies.

To achieve this objective, a stepwise multiple regression equation has been constructed. The dependent variable Tobin's Q has been used to measure firm value, while a survey instrument was used to measure the independent variable ERM. In order to examine the relationship between ERM and Tobin's Q, the study included control variables in the equation that are hypothesized to explain a variation in firm value. The control variables of ERM and firm value model are firm size, sales growth, leverage, dividends and ROA. The analysis and implications of each hypothesis are discussed separately below.

Analysis and Implications:

H1: The implementation of an enterprise risk management programme has a positive and significant relationship with firm value.

As presented in Chapter 5, the current study found a significant positive relationship between ERM stage and firm value. Therefore the results of the study support the hypothesis (H1).

The findings are consistent with the majority of other studies in the literature. For instance, the following studies found a significant positive relationship between ERM and firm value, Hoyt and Liebenberg (2008, 2011), McShane et al. (2011) (somehow), Walker et al. (2012), Baxter et al. (2013), Akbari et al. (2013), Farrell and Gallagher (2015), Bohnert et al. (2017), Lechner and Gatzert (2017) and Lun Chen (2019). Further, the results of this study contradict the finding of some prior studies, which found a positive but not statistically significant relationship between ERM and firm value (Tahir and Razali, 2011; Li et al., 2014; Sekerci, 2015).

The implications of this research for investors and creditors in making investment decisions and giving credit to a company are expected to consider internal factors such as Enterprise Risk Management (ERM) implementation and disclosure, earnings volatility and company characteristics like assets tangibility, profitability and leverage which have an influence on firm value. This research also has implications for company management in managing the company's business. It is expected that they can take policies such as increasing risk

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management implementation and disclosure, paying attention to earnings volatility, assets tangibility, profitability and leverage, which can affect the fluctuation of firm value. Likewise, this research has implications for auditors in determining the initial consideration of company risk and audit risk that can be used during the audit process and providing input to company management.

There are various implications for the study findings regarding the significant relationship between an upper ERM stage and firm value. The Implication for the senior executives responsible for overseeing the ERM programme is that they should continuously establish development plans to enhance ERM maturity level. In doing so, firms will improve their programme resilience to uncertainty, providing a mechanism for more effective strategic decision making.

These findings also provide several courses of actions for investors and creditors. Investors in energy and natural resources stocks should consider the presence of an ERM programme in the firm as one of the most important internal factors for their investment decision. This because ERM can control earning volatility and create shareholders value.

Moreover, companies and especially those who belong to the energy and natural resources sectors are exposed to an increasing number of new risks such as climate changes, cyber threats, operational risks and many other unexpected risks such as the most recent pandemic (Covid19). In order to manage these complexities without effecting shareholders value creation, firms should manage their risks holistically and ensure interconnectedness of the firm risks as well as their risk identification process. Unlike traditional risk management activities, these characteristics are available in Enterprise Risk Management which proved to have a significant relationship with firm value. Further implications for theory and practice are presented in chapter seven.

6.3.1 Firm Size and Firm Value

H2: There is a significant positive relationship between firm size and firm value.

The current study found a positive and significant relationship between firms size and firm value at 1%. Therefore the second hypothesis is accepted. The results of this study accord with a considerable number of authors (Colquitte et al., 1999; Jin and Jorison, 2006; Hoyt and Lienbenberg, 2008, 2011; Li et al., 2014). For example, Li et al. (2014) conduct a study to examine the effect of ERM on firm value in the Chinese insurance sector. The author collected data from 135 insurance firm in china using secondary sources. Their study found a non-statistically significant relationship between ERM and firm value; however, they found that the control variables firm size and leverage are positive and significantly related to firm value. The reason behind the positive impact of larger firms on firm value could be due to the high government support they receive compared to smaller firms (see Zou, 2010; Bohnert et al., 2017), their higher market power and lower bankruptcy risk (McShane et al., 2011; Lechner and Gatzert, 2017; Bohnert et al., 2017).

These findings imply that senior managers in the North American publicly traded companies are encouraged to focus on firm size as one of the main factors that increase their ability to create shareholder value. The firm can increase its size by issuing more shares, introducing new product lines, and acquisitions.

For investors, the study findings suggest that they should invest in larger firms in which there is a higher likelihood of value maximisation compared to firms that report a smaller amount of assets.

6.3.2 Leverage and Firm Value

H3: There is a significant negative relationship between leverage and firm value.

The third hypothesis in this study expected that leverage has a significant negative relationship with firm value. Unexpectedly, the Stepwise regression analysis did not choose leverage with other significant predictors. Thus H3 is rejected. However, by observing the tables of excluded variables in the regression output (Variables that are not statistically significant), we found that leverage has a negative coefficient.

The perfect sign (+ or -) of leverage is still ambiguous in the literature. On the one hand, many scholars and industry professionals presume that high leverage could be an indicator of net present value projects (through investments) (see Tahir and Razali, 2011; Li et al., 2014), reduction of agency cost (Sekerci, 2015) and tax savings (Zou, 2010; Li et al., 2014; Bohnert, 2017). On the other hand, a high leverage firm could increase the likelihood of insolvency risk and bankruptcy (Beasley et al., 2008; Hoyt and Liebenberg, 2011).

Therefore, due to the findings of the current study and the controversy of the leverage results in the literature, it is recommended that investors should not consider leverage as the primary indicator of value creation in their investment decisions. The study results also imply that senior managers should be cautious when using debt to expand or invest in new projects. This is because high debt could incur firms high agency cost. It could even lead to bankruptcy, especially if a financial crisis suddenly emerges, and the firm's risk management programme failed to mitigate its effect.

6.3.3 Return on Assets (ROA) and Firm Value

H4: There is a significant positive relationship between ROA and firm value.

The fourth hypothesis of this study postulated that there is a positive relationship between ROA and firm value. The results provided in chapter 5 shows a significant positive relationship at 1%, which means that H4 is accepted. This finding is consistent with the previous ERM studies (See Allayannis and Weston, 2001; Zou, 2010; McShane et al., 2011; Baxter et al., 2013;

Lechner and Gatzert, 2017). The relationship between ROA and firm value can be explained in several ways. First, it is commonly accepted in the corporate world that firms with a higher ROA ratio are more likely to trade at a premium in the stock market. This is because a rise in the firm's profitability increases its share price (Hoyt and Liebenberg, 2011). Secondly, ROA is considered one of the key ratios that investors usually consider before deciding to buy shares in public listed firms (Tahir and Razali, 2011).

Given that the presence of an effective risk management programme leads to a remarkable impact on organisations growth and profit margins, the energy and natural resources firm should work on improving their risk analysis process and integrating their risks management activities. In doing so, firms will be able to conduct more effective techniques, which will help them to avoid high costs due to faulty duplications in risk mitigation functions. As a result, firms will be able to enhance their profit margins.

6.3.4 Dividend and Firm value

H5: Firms that pay dividends for shareholders are more likely to have a higher firm value.

While the pay-out of dividend is commonly interpreted as the firm ability to generate cash which indicates a positive signal about their financial health (Li et al., 2014, Bohnert et al., 2017), the current study expected that dividend pay-out have a positive impact on firm value. Unexpectedly the Stepwise-regression model did not choose dividend with the significant predictors in the equation. Thus H5 is rejected. This finding is contrary to previous studies which were able to demonstrate a significant relationship between dividends and firms value (Hoyt and Liebenberg, 2008, 2011; Zou, 2010; Farrell and Gallagher, 2015; Sekerci, 2015; Bohnert et al., 2017; Lechner and Gatzert, 2017). Despite the significant results which have been reported in previous studies, yet the relationship coefficient is controversial, and there is no general agreement about the sign of the relationship between dividends and firm value in

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the literature. For instance, Serkeci (2015) conducted a study to examine whether ERM creates value for the firms using a sample of Nordic companies. Their study was unable to demonstrate a positive relationship between ERM and firm value. However, they found a significant positive relationship between dividend and firm value. These outcomes are contrary to that of Lechner and Gatzert (2017), who conducted a similar study on a different region. Their study found that the value creation of ERM is supported, but they reported a significant negative relationship between dividend and firm value.

Given that most previous ERM studies found a significant relationship between dividends pay-out and the firm's ability to create value, a possible explanation for the findings of this research is that the dividend data are too noisy. Another reason could be the effect of other variables explanatory powers in the equation or the weakness of the test. In this case, failing to find the expected results does not mean that the dividends pay-out is not an indicator of value creation. Further studies are needed to establish a greater degree of accuracy on this matter.

6.3.5 Sales Growth and Firm Value

H6: Sales growth is expected to have a significant positive relationship with firm value.

The last hypothesis in ERM and firm value model postulates that there is a significant positive relationship between a firm's profitability and firm value. Therefore this study used Sales-Growth as a proxy for profitability. The regression results accord with the hypothesis (H6), in which Sale Growth has a significant positive relationship with firm value at 1%. These results are in line with previous studies (McShane, 2011; Farrell and Gallagher, 2015; Anton, 2018) (See also the seminal work of Maury, 2006; King and Santor, 2008).

It is clear from the findings that firms should enhance their strategic decisions concerning net present value projects. In doing so, firms will be able to increase their growth factors and improve their firm value. The sales department could also coordinate their risks with other

departments using an enterprise-wide perspective. Doing so will allow them to reduce duplications in the risk mitigation process and develop risk management strategies that do not negatively affect sales. Another implication of this finding is that investors can use the sales-growth indicator to assess the firm's ability to create value before deciding to invest.

6.4 The Determinant of Enterprise Risk Management

The third research objective focuses on the firm characteristics (or determinants) associated with the adoption of ERM. The third objective is presented as follow:

3. To examine the firms' characteristics that influence ERM implementation in the North American energy and natural resources publicly traded companies.

To achieve this objective, an ordinal logistic regression model has been constructed. This regression equation examined the effect of several predictors (firm size, CRO, leverage, growth, the board of directors monitoring, big four audit and institutional ownership) and ERM implementation stage. Each predictor is hypothesised to have a different relationship with ERM stage. The analysis and applications of each hypothesis are explained below.

6.4.1 CRO and ERM Stage

H7: The presence of the CRO role has a significant relationship with ERM implementation.

Many authors who studied the current state of ERM in public listed companies used the presence of CRO position as an indicator of ERM implementation in the firms (see Hoyt and Liebenberg, 2003, 2008, 2011; Pagach and Warr, 2007, 2010; Eikenhout, 2015). Nevertheless, the impact of CRO position on the level of ERM deployment has received little attention in previous studies. Therefore, the current study filled the gap and found a significant positive relationship (p-value= .000) between the presence of CRO and an upper ERM stage. Thus H7 is accepted. These results reflect those of Gottwald and Mensah (2016), who also found a significant positive relationship between CRO and the presence of ERM programme in the firms. In the same vein, Beasley et al. (2005) conduct a study on the main influential factors of

ERM programme implementation in a sample of 123 US organisations. The results of his study indicated a significant positive relationship between the presence of a CRO position and a complete ERM programme in place (see also the landmark work of Kleffner et al., 2003).

The results of this study imply that firms are not hiring CRO as simple ''window dressing,'' (Bailey, 2019, p 19). However, they are using this pivotal role to advance their ERM programmes which in turns increase their firm value. This is because of the proven ability of the CRO to reduce the costs associated with risk responses and to communicate the firm's risk reports to stakeholders effectively. In other words, these results explain as to why firms should introduce a senior executive role (at C-suite level) for overseeing ERM programme. Even though such a position could incur additional cost on short-term, the company will achieve many benefits in the long-term.

6.4.2 Big Four Auditing Firm and ERM Stage

H8: The presence of a big four auditing firm has a significant positive relationship with ERM implementation.

This study also examined whether the presence of a big four auditor in the firms has an impact on the level of their ERM programme deployment. As can be seen from the results provided in chapter 5, the presence of a big four audit firm is positive but not statistically significant with ERM implementation stage. Hence, H8 is rejected. Although these results differ from some published studies (Beasley et al., 2005, Golshan and Rasid, 2012), they are consistent with those of Lechner and Gatzert (2017). Most of the researchers who postulate that the presence of a big four auditing firm has a positive influence on ERM implementation argue that the reason behind this relationship is due to the fact that these firms pay much attention to the quality of their customers' (companies) annual reports which profoundly affect their reputation.

Therefore they tend to encourage the firms' decision to implement an effective ERM programme (Yatim, 2009).

Although this study failed to support the initial hypothesis about the impact of big four audit firms on ERM adoption, it can be argued that these results are only valid for the North American energy and natural sector. Therefore, further research focusing on the characteristic of internal audit firms and their influence on the ERM implementation stage in the energy and natural resources industry and other sectors is highly recommended.

6.4.3 Board of Directors and ERM Stage

H9: Board of directors monitoring has a significant positive relationship with ERM implementation.

H9 of this study proposed that the board of directors monitoring (BOD) have a positive influence on ERM successful implementation. Results of the data analysis show that BOD is positive and statistically significant at 1% (p-value= 0.000). Comparison of the findings with those of other studies confirms that the board of directors is one of the main drivers of ERM implementation and effectiveness in the firms (Gordon et al., 2009; Daud & Yazid, 2011, Ping and Muthuveloo, 2015). For instance, Ping and Muthuveloo (2015) conducted a study to examine the effect of ERM on firm performance as well as the effect of the board of directors monitoring, firm size, and firm complexity on ERM implementation. In order to collect their study data, they sent a survey questionnaire for 800 Malaysian listed companies. Using Factor analysis, they found a significant positive relationship between ERM and firm performance. They also found that the board of directors monitoring, firm complexity and firm size significantly influence ERM implementation. These results indicate that the successful deployment of ERM programme requires a direct monitoring from the board and the senior managers of the firms (Shenkir, and Walker, 2006, Daud & Yazid, 2009) (see also Deloitte, 2014). Another possible explanation could be the major transformation in the role of the board

after the 2008 financial crisis. According to the Committee of Sponsoring Organisations of the Treadway Commission ERM Integrated framework (COSO, 2004), the role of the board of directors cover four main areas: 1. understanding the organization risk appetite, 2. oversight the effectiveness of the firm ERM, 3. monitor the firm's risk portfolio against its risk appetite, 4. monitoring evolving risks and senior management risk responses.

Therefore the combination of findings on the board of directors monitoring and ERM implementation suggests that it is crucially essential for the board members to be directly engaged in overseeing risk management policies. In doing so, continuous discussion about risk management practices and policies should be maintained at the board level. It has been reported that organisations where senior managers provide the board with reports about their top risk exposure at least annually have upper stage ERM programmes (Beasley, Branson and Pagach, 2015). Further, the board member should support the organisations' senior management in making decisions about strategic risks and adjusting the firm's risk appetite.

6.4.4 Institutional Ownership and ERM Stage

H10: Firms with a high percentage of institutional ownership are more likely to implement an ERM programme.

Institutional ownership is one of the variables in the ERM determinants model that is expected to have a significant positive relationship with ERM implementation in the firms. Contrary to expectations, this study did not find a statistically significant relationship between institutional ownership and ERM stages. Therefore H10 is rejected. Although there is a paucity of information about the impact of institutional ownership on ERM implementation in the literature, yet the finding of the current study are contrary to the available published research (see Hoyt and Liebenberg, 2008, 2011; Pagach and Warr, 2011). For example, in their landmark work, Hoyt and Liebenberg (2011) examined the determinants and value of ERM in a sample of US insurers. Using a maximum-likelihood treatment model, they found a

significant positive relationship between institutional ownership and ERM deployment. Even though their study provided a starting point for many future researches, nevertheless it was limited for using the insurance sample, which has been investigated several times.

Knowing that institutional ownership data has been collected from annual reports and financial databases, a potential of bias is not the reason for the conflicting results in this study. However, an explanation may be that institutional ownership has more power in the insurance sector or does not have a strong influence, particularly in the energy sector. In order to establish a full picture of these assumptions, additional studies will be needed on the energy and natural resources industry.

6.4.5 Firm Size and ERM Stage

H11: Larger Firms are more likely to implement an ERM programme.

Another major proposition by this study is the significant positive relationship between firm size and ERM stage. While it has been found by several authors that larger firms are more likely to have an ERM programme in place (see Beasley et al., 2005; Hoyt et al., 2008, 2011; Altuntas et al., 2011; Pagach and Warr, 2011; Farrell and Gallager, 2015; Serkeci, 2015; Ai et al., 2016; Berry-Stoelzle and Xu, 2016; Bohnert et al., 2017; Lechner and Gatzert, 2017), this does not appear to be the case in this study. In other words, the study results were unable to demonstrate that firm size influences ERM implementation. Thus, H11 is rejected. This inconsistency with previous studies may be due to several reasons. First, it has been argued that larger firms usually have more bureaucracy and regulatory requirements (Zou, 2010). Thus it can be suggested that huge firms avoided ERM implementation because it may complicate their risk management functions (Fraser et al., 2008). Secondly, while larger firms have high expenditures compared to smaller firms, it can be therefore assumed that larger firms avoid

ERM due to the high costs associated with its implementation (Lam, 2001; Meulbroek, 2002; Nocco and Stulz, 2006; Hoyt and Liebenberg, 2011; Li et al., 2014).

Due to these contradictory finding on the relationship between firm size and ERM implementation, this study suggests that in future investigations, it might be possible to split firm size into two variables (large firms and very large firms) and to examine their impact on ERM implementation. This could provide greater insight into the impact of firm size on ERM deployment.

6.4.6 Sales Growth and ERM Stage

H12: A firm with high sales growth are more likely to implement an ERM programme.

This study expected that firms with higher growth options are more likely to benefit from ERM implementation. Unlike our initial expectation, the finding of this study accords with previous studies which found no statistical significance between Sales Growth and ERM adoption (Pagach and Warr, 2011; Paape and Speklé, 2012; Pagach and Sekerci, 2019). Therefore H12 is rejected. Many ERM scholars have argued that greater growth options (Sales Growth) require a high debt capital which is commonly associated with a high level of uncertainty. Hence they suggest that ERM adoption may support the firms in managing these issues (Liebenberg and Hoyt, 2003; Beasley et al., 2008; Pagach and Warr, 2011).

Given that these assumptions have not been supported in any ERM study, it is possible, therefore, that sales growth is not an influential factor for organisations to implement an ERM programme. Since the examination of the impact of sales growth on ERM implementation indicated the same results several times, it is recommended to substitute it with a new variable that could contribute to the knowledge of ERM.

6.4.7 Leverage and ERM Stage

H13: Highly leveraged firms are more likely to implement an ERM programme.

The current study also investigates whether leverage has a significant relationship with ERM implementation. As can be seen from the results provided in Chapter 5, leverage is negative and statistically significant with ERM stage. In other words, firms that are highly leveraged are unlikely to have an upper stage of ERM programme. Hence H13 is rejected. Similar to the relationship between leverage and firm value, the impact of leverage on ERM adoption decision is also ambiguous in the literature. While only a few authors found empirical results supporting the hypothesis that leverage positively influence ERM implementation in the organisations (Liebenberg and Hoyt, 2003; Golshan and Rasid, 2012), the majority of previous studies indicated that the relationship is negative (Hoyt and Liebenberg, 2008, 2011; Baxter, 2013; Sekerci, 2015; Berry-Stoelzle and Xu, 2016; Bohner et al., 2017; Lechner and Gatzert, 2017). The negative association between leverage and ERM could be due to the high financial risks that are commonly associated with highly leveraged firms. These financial uncertainties could lead to fewer resources which may, in turn, hinder the effective implementation of ERM (Baxter, 2013). These findings suggest that firms should ensure that they have adequate financial health before they began the ERM implementation process. Otherwise, they could start by partially implementing ERM with a plan for ongoing development in the programme.

In order to get a better understanding of the possible relationship between leverage and ERM implementation, future studies could include more than one leverage ratio in the regression model. For instance, instead of mainly using debt to equity ratio as a proxy for leverage, other ratios such as Debt-to-Capital Ratio, Asset-to-Equity Ratio and Debt-to-EBITDA Ratio could also be examined.

6.5. Risk Culture and ERM Stage

The last research objective mainly focuses on whether the organisation culture fosters the successful implementation of ERM. Thus it is presented as follow:

4. To determine the effect of the firms' risk culture on ERM implementation stage in the North American energy and natural resources publicly traded companies.

In order to answer this research question, risk culture has been coded and entered as a dummy variable in the determinants of ERM equation. Chapter five includes the data analysis and the ordinal logistic regression results of the assumption. The hypothesis of risk culture and ERM stage is listed below as well as the discussion of results and their implications for stakeholders.

6.5.1 The Effect of Risk Culture on ERM Stage

H14: Risk Culture has a positive and significant relationship with an upper ERM stage.

Given the importance of risk culture for ERM effectiveness in the firms (see COSO, 2017), the extent to which it influences the implementation of ERM programme is still poorly understood in the literature. In order to fill this gap in the knowledge of ERM, this study hypothesised that the firm risk culture has a positive and significant relationship with ERM stage. The results presented in chapter 5 support the study hypothesis (H14), where risk culture is positive and statistically significant, with ERM at 5%. These results agree with the findings of other studies (see Aabo et al., 2005; Kimbrough and Componation, 2015) (see also Kleffner et al., 2003). For example, in their pioneering work, Kimbrough and Componation (2015) examined the relationship between organisation risk culture and ERM implementation. Building on the work of Reigle (2003), they used the organisation culture assessment tool (OCA) to assess the organisation culture in their sample as well as an online survey in association with the Institute of the internal auditors to examine the current state of ERM. Their study found a significant positive relationship between organisation risk culture and ERM effective deployment. Further, these results have been supported by several assumptions in the literature. For instance, Ahmed and Manab (2016) postulate that senior managers should take into account their organisations' risk culture to be able to operate their ERM programme effectively. Similarly, Fraser and

Simkins (2016) argue that the successful deployment of ERM is highly reliant on the firms' readiness for openness, collaboration, and enhanced communication at all organisation levels.

These findings have crucial implications for senior managers and especially those who are directly involved in implementing and overseeing the ERM programme. First, in order to have a faster and more effective ERM implementation process, the organisation culture should be ready and supportive. It is thus essential to assess the organisation culture at all level using an internal survey instrument or other effective tools to get a clearer understanding of any cultural obstacles that may hinder the implementation process. Culture pre-assessment will not only provide an overview of the organisation readiness for a transformation in their risk policies and risk management programme but also it will help managers to target specific areas for empowering the culture.

Despite these promising results, several questions remained unanswered at present. For instance, what are the desired cultural characteristics for ERM implementation? Another critical question could be, what is the most reliable instrument for measuring the organisation culture readiness for ERM implementation? Further studies, which take these variables into account, will need to be undertaken.

6.6 Summary

This chapter discussed the findings of the data analysis, which have been presented in chapter five. The data have been discussed and compared to the available literature. Further, the implications and suggestions for future studies have also been covered.

The first section of the chapter discussed the results of the current state of ERM in the North American energy and natural resources companies. The results indicated that although the vast majority of firms have some kinds of ERM activities, yet the ERM programme is still at an

immature level in this sector. The study recommends that managers should increase the budget of ERM developments and embed risk management in their firms' culture.

The second section discussed the results on the effect of ERM on firm value. The study found a significant positive relationship between an upper ERM stage and firm value. Also, the control variables: firm size, ROA and sales growth were found positive and statistically significant with firm value. These findings suggested that senior managers should reduce their dependence on traditional risk management practices such as hedging activities and focus on developing a holistic risk management programme. In doing so, firms will be able to enhance their shareholders and stakeholders value creation.

The third section discussed the results of the determinants of ERM implementation. The results showed that the presence of CRO, the board of directors monitoring and leverage significantly affect the adoption of ERM programme. The implication of each factor has been provided with suggestions for future studies.

Finally, the chapter discussed the results on the effect of risk culture on ERM implementation stage. The results indicated that risk culture is a crucial influential factor for ERM successful implementation. The study suggested that firms should assess their organisation culture using an internal survey or another assessment tool in order to establish an overview of the obstacles which may face ERM implementers during the deployment process. The study also provided several recommendations for future risk culture and ERM studies.

The following chapter will provide a detailed discussion of the study contributions to theory, implications to the professional practice, recommendations, limitations and suggestions for future work.

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Chapter Seven
Conclusion and Recommendation

The present study was designed to determine the effect of the adoption of Enterprise Risk Management (ERM) on firm value in the North American energy and natural resources sector. This chapter provides a summary of the study findings and their contribution to the theory and professional practice. Further, the recommendations of the study, its limitations and various suggestion for future research are set out and demonstrated in this chapter.

7.1 Rationale of the Study

The last two decades witnessed an upsurge in the development of Enterprise Risk Management concept. One of the main reason behind this rapid growth was the financial crisis that started at the end of 2007 in the US and caused severe losses, especially in the financial institutions and the energy sector. While some scholars and industry practitioners attributed the crisis to poor risk management strategies (see, Manab et al., 2010; Fraser and Simkin, 2010), such as aggressive hedging and other traditional risk management activities, ERM advocated as a solution for these problems. One of the main advantages of ERM above TRM is its holistic approach which enables the firms to manage their risks as an entire portfolio. In doing so, firms will be able to absorb a larger number of risks and create value for their shareholders (Hoyt and Liebenberg, 2011; Bohnert et al., 2017) through optimising their risk-return trade-off (Nocco and Stulz, 2006; Farrel and Gallagher, 2015; Lechner and Gatzert, 2017).

Due to these presumed benefits of ERM, the literature has extensively addressed the research question of whether ERM has a significant impact on firm value. Nevertheless, the findings of previous studies in the area are controversial and subject to a considerable number of limitations. Firstly, most ERM studies in the literature relied on secondary data for identifying ERM state in the firms (such as scanning annual reports of ERM keywords). This method has

been severely criticised for its lack of accuracy. Secondly, the largest number of published studies mainly focused on the financial services and insurance industry, while there is a paucity of information on the value of ERM in the energy and natural resources sectors. These factors led to slow development in ERM implementation, especially in this sector. Other factors which hindered the ERM implementation process is the lack of clear empirical evidence on the key drivers and firms characteristics (determinants of ERM) that can influence ERM implementation success.

In order to fill these gaps in the literature, this study aimed to address the following objectives:

1. To measure the level of ERM implementation in the North American energy and natural resources publicly traded companies.

2. To investigate the effect of the adoption of enterprise risk management on firm value in the North American energy and natural resources publicly traded companies.

3. To examine the firms' characteristics that influence ERM implementation in the North American energy and natural resources publicly traded companies.

4. To determine the effect of the firms' risk culture on ERM implementation stage in the North American energy and natural resources publicly traded companies.

7.2 Identifying the Current State of ERM

Unlike the vast majority of ERM studies in the literature who used either proxies and keyword search (see, Liebenberg and Hoyt, 2003; Beasley et al., 2008; Pagach and Warr, 2010; Hoyt and Liebenberg, 2011; Tahir and Razali, 2011; Eckles et al., 2014) or other secondary methodologies such as S&P's ratings (McShane et al., 2012; Pooser, 2012; Baxter, 2013; Bohnert et al., 2017) this study assessed ERM state directly using an online survey tool. The survey has been sent to all the energy and natural resources companies listed in the New York Stock exchange and NASDAQ. ERM measurement scale has been adopted from the seminal

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work of Beasley et al. (2005). The survey item which has been used to measures the state of ERM consists of 5 points ordinal scale. This method has a distinct advantage in terms of accuracy and clarity over other categorical scales (yes or no), which has been widely used in previous ERM studies.

The survey results indicated that the largest number of firms are those who have a complete ERM programme and a partial ERM programme in place. Most of the companies that did not implement an ERM showed that they had understood its benefits, and they are either planning to implement the programme or still investigating it. Only a few companies stated that they have no plan to implement ERM. The most surprising aspect of the survey results is the immaturity of ERM programme in the North American energy and natural resources sector. In other words, the majority of respondents indicated they implemented their ERM programme only 5 to 6 years ago, while ERM programme has been introduced for more than two decades. These results revealed that the development of ERM is slow in this particular sector.

Another key finding is that the majority of firms that have an upper ERM stage have appointed a senior executive or CRO to oversee their ERM Programme. The CRO of the firms mainly reports to the Chief Financial Officer (CFO) who is commonly responsible for the financial policy of the organisation. Further, the survey also discovered that the board of directors is a vital driver of the firms' decisions to deploy ERM.

Therefore this research achieved the first research objective.

7.3 ERM and Firm Value
The principal aim of the present research is to examine the effect of the adoption of enterprise risk management on firm value in the North American energy and natural resources sector. While regulators (Moody's, 2012, Standard & Poor's, 2013), management consultants (Deloitte, 2018; KPMJ, 2017), governments and stock markets (NYSE, 2014; TSX, 2017) have

recommended ERM as one of the main factors for value creations, the results of academic studies regarding this particular aspect are mixed. In order to address this gap, an online survey was employed and sent to all the North American energy and natural resource companies listed in NYSE and NASDAQ. The ERM survey collected data about the current state of ERM in the sector, followed by secondary data collection for other variables from annual reports and companies financial databases. In line with a considerable number of previous studies (see Baxter et al., 2013; Akbari et al., 2013; Farrell and Gallagher, 2015; Bohnert et al., 2017; Lechner and Gatzert, 2017; and Lun Chen, 2019), this the study confirms that ERM implementation fosters firm value. Further, it was found that sale growth, firm size and ROA can improve firm value in terms of Tobin's Q.

Therefore the second objective of this study has been achieved.

7.4 The Determinants of ERM Implementation

As can be seen from the survey results of this study presented in chapter four, many firms that do not have an ERM programme in place are planning to implement one. However, a lack of clear understanding of ERM influential factors could slow down the implementation process and decrease its effectivity (Sithipolvanichgul, 2016). This situation is similar to many other firms that have established ERM initiatives, but they are missing this critical information for ERM successful deployment. Therefore the third objective of this study is to provide insight into the firm's characteristics and drivers that influence ERM implementation in the firms. After collecting that data using the survey tool and the secondary sources (annual reports and financial databases), an ordinal logistic regression model has been employed. The empirical results indicate that the board of directors monitoring and the presence of CRO position have a statistically significant positive relationship with an upper ERM stage. In contrast, leverage has a significant negative relation with ERM stage.

Therefore the third objective of this study has been achieved.

7.5 Risk Culture and ERM Successful Implementation

There is a growing body of literature that recognises the importance of organisations' culture for ERM effectiveness (Kimbrough and Componation, 2009; COSO, 2017; Chen, Jiao and Harrison, 2019). Many organisations are facing difficulties in transforming their traditional risk management to ERM because of cultural barriers. Despite these critical concerns, there is a paucity of empirical information about the impact of organisational risk culture on the success of ERM implementation in the firms (see Cooper et al., 2013; Kimbrough & Componation, 2009; Chen, Jiao and Harrison, 2019). Thus, this study investigated this aspect by including an item in the online survey for measuring the impact of risk culture on ERM implementation in the participant's companies. The survey results were coded and included in the ordinal logistic regression of the determinants of ERM model. It was found that the risk culture has a statistically positive significant relationship with an upper ERM implementation stage.

Therefore the study achieved its last objective.

7.6 Contribution to ERM Theory and Literature

This research makes several contributions to theory and the current literature. Firstly, this study has been one of the first attempts to thoroughly examine that effect of ERM implementation on firm value in the North American energy and natural resources sector. While previous ERM studies mainly focused on the insurance and financial services industry (see Kleffner and Lee, 2003; Hoyt and Liebenberg, 2008, 2011; Acharyya, 2008; Pagach and Warr, 2010; Wu et al., 2014; Soliman and Adam, 2017; Lundqvist and Vilhelmsson, 2018; Altuntas et al., 2019), this study adds to the growing body of ERM literature in terms of its scope and sample. The results of this study provide an insight on the current state of ERM in the North American energy and natural resources sector as well as other critical information which will serve as a base for future studies on this particular sector. Secondly, using secondary sources for collecting data about ERM current state is considered one of the most popular methods in ERM studies (Hoyt

and Liebenberg, 2011; Lin, Wen and Yu, 2012). Nevertheless, this approach has been severely criticised for accuracy issues. For the knowledge of the researcher, the current study is one of the very few ERM studies which used both a survey (primary data) and secondary data for its data collection method. Therefore this thesis will help other researchers to design their studies using a different approach which has several strengths over previous studies in terms of reliability and accuracy.

The principal contribution of this study is that it supports the Value Maximisation Theory and provides a strong empirical confirmation about the value of ERM. In other words, as ERM implementation stage increases, firm value proxy Tobin's Q increases. Also, this study has pointed out the firm characteristics that impact firm value.

Moreover, the empirical findings of this study provide a clearer understanding of the influential factors of ERM successful implementations. The study revealed that the presence of CRO, the board of directors monitoring, risk culture and leverage significantly influence the effectiveness of ERM implementation in the organisations.

7.7 Contribution to Practice (Managerial Implications)

The findings of this study have many important implications for future practice. Each contribution is listed below:

1. **Energy and natural resources companies (CEO, CFO, and COO):** The findings of this study support the previous recommendation by regulators, auditing firms, stock markets and other international organisations, about the value of enterprise risk management. While this study mainly targeted the North American energy and natural resources sector, the implications of results are applied explicitly to companies that belong to this industry. Generally, this study creates an urge for senior executives (CEO, CFO, COO) in the energy and natural resources industry to transform their

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tradition risk management (TRM) policy (If any) into an ERM programme. Unlike TRM, which manages risks in silos, ERM allows the firms to manage their entire risk portfolio holistically. In doing so, firms will be able to reduce the cost of faulty duplications in their risk mitigation process. Besides, the research provides a clearer understanding of the main firm characteristics which influence firm value in this sector. These factors can be taken into consideration by senior managers for long-term strategic planning.

2. **ERM implementers and senior executives:** This study found a significant relationship between specific firm characteristics (CRO, the board of directors monitoring and leverage) and ERM stage. These findings provide a clearer understanding of the influential factors of ERM implementation for ERM implementers, senior executives and the board of directors. These results may support organisations that have set up ERM deployment initiatives, but, they did not proceed because they lack information about the determinants of ERM success. Further, it may support those who already have an ERM in place to upgrade their programme into an upper level.

3. **Risk Culture Policy:** In addition, this study revealed that organisations risk culture have a significant influence on ERM implementation in terms of effectiveness and speed. These findings are relevant for both ERM implementers and policymakers.

4. **Investors:** one of the most important aspects that an investor takes into consideration before deciding to invest is to ensure that the company is cable of creating shareholder value. This study provides the investors with an insight into the main factors that influence firm value, especially in the North American energy and natural resources sector.

5. **Regulatory bodies and governments:** The findings of ERM survey will help regulators and policymakers in the North American energy and natural resources

sectors to identify areas of development in the risk management policies that need immediate attention.

7.8 Recommendations of the Study

The findings of this study provide several recommendations for practice and policy:

1. Enterprise Risk Management planning and implementation should start from the top level in the organisations and include the CEO, the board and all other senior executives. Moreover, the objectives of implementing ERM, its meaning and benefits to the organisations should be communicated to stakeholders at all levels.

2. In case CRO position is not available, CFO should have a principal role in ERM implementation process. Knowing that the CFO is the person who is responsible for the organisations' financial policy and all other risk management strategies, they could provide very effective support for ERM implementers.

3. Ensuring an appropriate ERM framework should be a top priority. This study recommends adopting the COSO framework, which has been cited many time in academic literature and business articles.

4. Hire an inspirational CRO who is not only skilled in reducing cost and in taking accurate risk management decisions on behalf of the firms but also able to communicate the firm risk profile effectively to the stakeholders.

5. ERM implementers should assess the firm culture and its readiness for ERM. This can be achieved by using an internal survey or ongoing meetings with the department's managers. While firms mainly provide technical ERM training only for the employees who are directly involved in risk management functions, it is essential to deliver a general or less technical training for all the employees in the firm. This will help in

raising employee risk awareness and in speeding up the implementation process of ERM.

6. Risk oversight should be one of the top priorities of the board. In order to oversee the firm ERM functions effectively, the board should continuously monitor the ERM agenda. Also, the board should establish strong communication and relationship with the senior executive responsible for ERM programme (such as CEO, CFO or CRO). This interaction between the board and managers at the C-suite level will keep the board fully informed of any new uncertainty facing the firm. In addition, establishing this active communication channel will help the board to monitor and evaluate risk managers approach to ERM.

7.9 Limitations and Suggestions for Future Research

This study focused only on the North American energy and natural resources sector. Thus the generalisability of these findings are somewhat limited to this particular sector. In addition, to get access to Tobin's Q variable (dependent variable) and other financial and accounting metrics (ROA, sale growth, leverage, firm size), the study focused only on the energy and natural resources companies listed in NYSE and NASDAQ. This method allows the researchers to access companies' information from their annual reports and financial databases. Therefore the lack of non-listed energy and natural resources companies in the sample adds further caution regarding the generalisability of these findings.

Another major limitation of this study lies in the survey methods, which has been employed to examine the current state of ERM in the firms. Using a survey tool to measure ERM state could be subject to managerial bias in which some managers may tend to overstate the level of ERM implementation in their firms. In order to reduce the effect of this limitation, the survey clearly stated that the name of the participants and their companies would not be presented in the study.

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7.10 Scope for Further Work:

This study has posted many questions in need of further investigation. First, this study used Tobin's Q as a firm value proxy to examine the value of ERM implementation. Hence, future studies should explore the effect of ERM on different firm value metrics such as ROA, Market Value Added (MVA) and Economic Value Added (EVA). Using various firm performance metrics in future studies will help to establish a higher degree of accuracy on the value of ERM implementation.

Another possible area for future research would be investigating for other ERM implementation influential factors or to concentrate on examining one ERM implementation driver. For example, it would be interesting to focus on examining the impact of risk culture on ERM stage. This could develop a deeper understanding of the desired culture characteristic for ERM implementation.

Finally, while many previous studies examined the effect of ERM on firm performance during the great financial crisis in 2008 (see Baxter, Bedard and Hoitash, 2013; Geessink, 2012), the 2019 COVID 19 pandemic would be a remarkable topic for future research. An interesting topic for further work in this area would be the effect of ERM on firm value during COVID 19 in the healthcare sector.

7.11 Summary

This research examined the effect of the adoption of ERM on firm value in the North American energy and natural resources sector as well as the influential factors of ERM successful implementation. The study also examined the effect of risk culture on ERM implementation stage. One of the critical challenges facing ERM scholars is how to identify ERM current state in the firms. This is due to the absence of information about the types of risk management programmes adopted by the firms. While many researchers relied on secondary data such as

keyword search for identifying ERM implementers, this study used a survey method similar to that of Beasley et al. (2005). Other data, such as firm value proxy (Tobin's Q) and other financial and accounting metrics, have been collected from the companies' databases and annual reports. The study used Stepwise multiple regression to examine ERM and firm value model and ordinal logistic regression to examine the determinants of ERM implementation.

The research findings regarding the relationship between ERM and firm value is supported and consistent with those of previous studies. The study also found that the firm characteristics: firm sizes, ROA and sales growth are positive and significantly related to firm value. In addition, the results suggest that board of directors monitoring and the presence of CRO are crucial for an upper stage of ERM implementation, while leverage could affect ERM implementation negatively. The research has also shown that risk culture has a significant positive influence on ERM stage. This research has several contributions for theory and practice (see sections 7.2 and 7.3, respectively). Prior to this study, it was difficult to predict the current state of ERM and its effect on firm value in the North American energy and natural resources sector. This is because most of the previous ERM scholars mainly focused on the financial service and insurance industry. Further, this study provided strong empirical confirmation about the value of ERM as well as the key drivers of ERM successful implementation. Another contribution is using quantitative multi-methods for addressing the research objectives. This methodology has not been identified in previous ERM studies.

This study acknowledges the limitations of its research approach. While using the survey tool to identify ERM state in the firms is consider one of the main strength of this study, yet this method is limited to the likelihood of managerial bias in which some managers may overstate their ERM stage. In order to reduce the effect of this limitation, the study clearly mentioned that the names of the participants and their organisation would not be disclosed (section 7.9).

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Another major limitation of this study is focusing only on the North American energy and natural resources sector. Thus it is possible that the results of the study may not be generalisable on other sectors. For overcoming this limitation, future research targeting a more extensive range of sectors will need to be undertaken (section 7.10).

References

Aabo, T., Fraser, J.R. and Simkins, B.J., 2005. The rise and evolution of the chief risk officer: enterprise risk management at Hydro One. *Journal of Applied Corporate Finance*, 17(3), pp.62-75.

Aabo, T., Hansen, M.A. and Pantzalis, C., 2012. Corporate foreign exchange speculation and integrated risk management. Managerial Finance.

Abdullah, M.H.S.B., Janor, H., Hamid, M.A. and Yatim, P., 2017. The effect of enterprise risk management on firm value: Evidence from Malaysian technology firms. *Jurnal Pengurusan (UKM Journal of Management),* 49.

Acharyya, M., 2008. In measuring the benefits of enterprise risk management in insurance: An integration of economic value added and balanced scorecard approaches. ERM Monograph, pp.1-25.

Acharyya, M., 2008. In measuring the benefits of enterprise risk management in insurance: An integration of economic value added and balanced scorecard approaches. Society of Actuaries, Working paper.

Adeboye, N.O., Fagoyinbo, I.S. and Olatayo, T.O., 2014. Estimation of the effect of multicollinearity on the standard error for regression coefficients. *Journal of Mathematics*, 10(4), pp.16-20.

AFP, 2013. 2013 AFP Risk Survey. Oliver Wyman. Available at: https://www.oliverwyman.com/content/dam/oliverwyman/global/en/files/archive/2013/2013_AFP_Risk_Survey_-_Final.pdf.

Agarwal, R. and Ansell, J., 2016. Strategic change in enterprise risk management. Strategic Change, 25(4), pp.427-439.

Aggarwal, R. and Ranganathan, P., 2019. Study designs: Part 2–Descriptive studies. Perspectives in clinical research, 10(1), p.34

Agustina, L. and Baroroh, N., 2016. The relationship between Enterprise Risk Management (ERM) and firm value mediated through the financial performance. Review of Integrative Business and Economics Research, 5(1), p.128.

Ahmad, S., Ng, C. and McManus, L., 2014, August. Enterprise risk management (ERM) implementation: Some empirical evidence from large Australian companies. In Proceedings of the International Conference on Accounting Studies (ICAS 2014) (pp. 18-19).

Ahmed, H., Azevedo, A. and Guney, Y., 2014. The effect of hedging on firm value and performance: Evidence from the nonfinancial UK firms. European Financial Management Association, 44, pp.1-citation_lastpage.

Ahmed, I. and Manab, N.A., 2016. Influence of enterprise risk management success factors on firm financial and non-financial performance: A proposed model. *International Journal of Economics and Financial Issues*, 6(3).

Ai, J., Bajtelsmit, V., Wang, T.: The combined effect of enterprise risk management and diversification on property and casualty insurer performance. J. Risk Insur. (2016). https://doi.org/10.1111/jori.12166

Ai, J., Brockett, P.L., Cooper, W.W. and Golden, L.L., 2012. Enterprise risk management through strategic allocation of capital. *Journal of Risk and Insurance*, 79(1), pp.29-56.

Ai, J., Brockett, P.L., Wang, T.: Optimal enterprise risk management and decision making with shared and dependent risks. J. Risk Insur. (2016). https://doi.org/10.1111/jori.12140

AICPCU. 2013. Enterprise Risk Management, First Edition. Edited by Michael W. Elliott, Malvern, Pennsylvania: The Institutes

AIG, 2010. Annual Report 2010. Available at: https://www.aig.com/content/dam/aig/america-canada/us/documents/investor-relations/2010-annual-report.pdf.

AIRMIC, A. and IRM, A., 2002. A risk management standard. AIRMIC, ALARM, IRM.

AIRMIC, Alarm, IRM. 2010. A structured approach to Enterprise Risk Management (ERM) and the requirements of ISO 31000

Al-Amoudi, I. and Willmott, H., 2011. Where constructionism and critical realism converge: Interrogating the domain of epistemological relativism. Organization Studies, 32(1), pp.27-46.

Alawattegama, K.K., 2018. The Effect of Enterprise Risk Management (ERM) on Firm Performance: Evidence from the Diversified Industry of Sri Lanka. *Journal of Management Research*, 10(1), pp.75-84.

Alajmi, M., 2019. Enterprise risk management: development of strategic ERM alignment framework for oil and gas industry in Kuwait (Doctoral dissertation, Brunel University London).

Alexander, C. ed., 2003. Operational risk: regulation, analysis and management. Pearson Education.

Al-Farsi, H.A.H., 2020. The Influence of Chief Risk Officer on the Effectiveness of Enterprise Risk Management: Evidence from Oman. *International Journal of Economics and Financial Issue*s, 10(1), pp.87-95.

Alhajji, A.F., 2005. The oil weapon: past, present, and future. *Oil & gas journal*, 103(17), pp.22-33.

Alin, A., 2010. Multicollinearity. *Wiley Interdisciplinary Reviews*: Computational Statistics, 2(3), pp.370-374.

Aljarrah, M. and Al-Jarrah, Y., 2017. Using stepwise regression to investigate customers' propensity to change cellular phone providers. *Global Journal of Pure and Applied Mathematics*, 13(9), pp.5013-5020.

Allayannis, G. and Weston, J.P., 2001. The use of foreign currency derivatives and firm market value. The review of financial studies, 14(1), pp.243-276.

Allayannis, G., Lel, U. and Miller, D.P., 2012. The use of foreign currency derivatives, corporate governance, and firm value around the world. *Journal of International Economics*, 87(1), pp.65-79.

Allison, P.D., 2014, March. Measures of fit for logistic regression. In Proceedings of the SAS Global Forum 2014 Conference (pp. 1-13).

Altunas, M., Berry-Stolzle, T.R. and Hoyt, R.E., 2011. Dynamic Determinants of Enterprise Risk Management Adoption in the Property-Liability Insurance Industry: Evidence from Germany.

Altuntas, M., Berry-Stölzle, T.R. and Cummins, J.D., 2019. Enterprise risk management and economies of scale and scope: evidence from the German insurance industry. Annals of Operations Research, pp.1-35.

Altuntas, M., Berry-Stölzle, T.R. and Hoyt, R.E., 2011. Implementation of enterprise risk management: Evidence from the German property-liability insurance industry. The Geneva papers on risk and insurance-issues and practice, 36(3), pp.414-439.

Altuntas, M., Liebenberg, A.P., Watson, E.D. and Yildiz, S., 2017. Hedging, cash flows, and firm value: evidence of an indirect effect. *Journal of Insurance Issues*, pp.1-22.

Alvarez, S.A. and Barney, J.B., 2005. How do entrepreneurs organize firms under conditions of uncertainty?. *Journal of Management*, 31(5), pp.776-793.

Alvesson, M. and Sköldberg, J., 1994. Vetenskapsfilosofi och kvalitativ metod. Studentlitteratur, Lund.

Al-Yousef, N.A., 1998. *Modelling Saudi Arabia behaviour in the world oil market 1976-1996* (No. 93). Surrey Energy Economics Centre (SEEC), School of Economics, University of Surrey.

Andersen, H., Liungman, C.G. and Mårtensson, B., 1994. Vetenskapsteori och metodlära: introduktion. Studentlitteratur.

Andersen, T. J. & Schroder, P. W., 2010. Strategic Risk Management Practice: How to Deal with Major Corporate Exposures. Cambridge, United Kingdom: Cambridge University Press.

Andersen, T.J., 2008. The performance relationship of effective risk management: exploring the firm-specific investment rationale. Long Range Planning 41 (2), 155e176.

Andersen, T.J., 2011. Strategic risk management practice: How to deal effectively with major corporate exposures. Strategic Direction.

Annamalah, S.; Murali, R.; Marthandan, G. & Logeswaran, A.K. (2018). Implementation of Enterprise Risk Management (ERM) Framework in Enhancing Business Performances in Oil and Gas Sector. Economies, 6(2), 1-12.

Anton, S.G., 2018. The impact of enterprise risk management on firm value: Empirical evidence from Romanian non-financial firms. *Engineering Economics*, *29*(2), pp.151-157.

Antwi, S.K. and Hamza, K., 2015. Qualitative and quantitative research paradigms in business research: A philosophical reflection. *European journal of business and management*, 7(3), pp.217-225.

Ardasa, I., Djalil, M.A., Harmani, H., Jalaluddin, J. and Nadirsyah, N., 2020. The Influence of Chief Risk Officer, Financial Slack and Firm Size on Enterprise Risk Management Disclosure: An Empirical Study on Mining Companies Listed on Indonesia Stock Exchange. In Proceedings Aceh Global Conference-Business, Economics, and Sustainable Development Trends (Vol. 2, p. 92).

Arena, M., Arnaboldi, M. and Azzone, G., 2010. The organizational dynamics of enterprise risk management. Accounting, Organizations and Society, 35(7), pp.659-675.

Aven, T., 2011. On the new ISO guide on risk management terminology. Reliability Engineering & System Safety, 96(7), 719-726.

Aven, T., 2012. Foundational issues in risk assessment and risk management. Risk Analysis: *An International Journal*, 32(10), pp.1647-1656.

Aven, T., Renn, O. (2009). On risk defined as an event where the outcome is uncertain. *Journal of Risk Research*, 12, 1–11.

Ayer, A.J., red.1969, Logical Positivism.

Bac, M., 2010. Models of risk management in organisations. Zeszyty Naukowe Małopolskiej Wyższej Szkoły Ekonomicznej w Tarnowie, (2 (16)), pp.7-15.

Bachiller, P., Boubaker, S. and Mefteh-Wali, S., 2020. Financial derivatives and firm value: What have we learned?. Finance Research Letters, p.101573.

Baffes, J., Kose, M.A., Ohnsorge, F. and Stocker, M., 2015. The great plunge in oil prices: Causes, consequences, and policy responses. Consequences and Policy Responses (June 2015).

Bailey, C., 2015. The effect of chief risk officer and risk committee expertise on risk management. Available at SSRN 2645994.

Bailey, C., 2019. The Relationship between Chief Risk Officer Expertise, ERM Quality, and Firm Performance. *Journal of Accounting, Auditing & Finance*, p.0148558X19850424.

Banham, R., 2004. Enterprising views of risk management. *Journal of Accountancy*, 197 (6), 65–71.

Banham, R., 1999. Kit and Caboodle: Understanding the Skepticism about Enterprise Risk Management. CFO Magazine (April)

Banham, R., 2003. Fear factor: Sarbanes-Oxley offers one more reason to tackle enterprise risk management. CFO Magazine, (June 1).

Barton, T.L., Shenkir, W.G. and Walker, P.L., 2002. Making enterprise risk management pay off. FT Press.

Baxter, R., Bedard, J.C., Hoitash, R. and Yezegel, A., 2013. Enterprise risk management program quality: Determinants, value relevance, and the financial crisis. Contemporary Accounting Research, 30(4), pp.1264-1295.

Beale, E.M.L., 1970. Note on procedures for variable selection in multiple regression. Technometrics, 12(4), pp.909-914.

Beasley, M., Branson, B. and Hancock, B., 2014. Report On The Current State Of Enterprise Risk Oversight: Opportunities To Strengthen Integration With Strategy. [Online] North Carolina State University. Available at: https://erm.ncsu.edu/az/erm/i/chan/library/AICPA_ERM_Research_Study_20142.pdf.

Beasley, M., Branson, B. and Hancock, B., 2017. The State of Risk Oversight: an Overview of Enterprise Risk Management Practices. [Online] North Carolina State University. Available at: https://erm.ncsu.edu/az/erm/i/chan/library/AICPA_ERM_INITIATIVE_Research_Study_2017.pdf.

Beasley, M., Branson, B. and Hancock, B., 2019. Current State of Enterprise Risk Oversight. NC State University. Available at: https://www.cgma.org/content/dam/cgma/resources/reports/downloadabledocuments/erm-research-study-2019.pdf.

Beasley, M., Branson, B. and Pagach, D., 2015. An analysis of the maturity and strategic impact of investments in ERM. Journal of Accounting and Public Policy, 34(3), pp.219-243.

Beasley, M., Pagach, D. and Warr, R., 2008. Information conveyed in hiring announcements of senior executives overseeing enterprise-wide risk management processes. *Journal of Accounting, Auditing & Finance*, 23(3), pp.311-332.

Beasley, M.S., Branson, B.C. and Hancock, B.V., 2010. COSO's 2010 Report on ERM. Current State of Enterprise Risk Oversight and Market Perceptions of COSO's ERM Framework, Research commissioned by COSO.

Beasley, M.S., Carcello, J.V., Hermanson, D.R. and Neal, T.L., 2010. Fraudulent financial reporting: 1998-2007: An analysis of US public companies. COSO, Committee of Sponsoring Organizations of the Treadway Commission.

Beasley, M.S., Clune, R. and Hermanson, D.R., 2005. Enterprise risk management: An empirical analysis of factors associated with the extent of implementation. *Journal of accounting and public policy*, 24(6), pp.521-531.

Beasley, M.S., Frigo, M.L. and Frameworks, E.R.M., 2010. Enterprise risk management. Chap, 7, pp.97-124.

Bell, E., Bryman, A. and Harley, B., 2018. Business research methods. Oxford university press.

Bell, J., 2014. Doing Your Research Project: A guide for first-time researchers. McGraw-Hill Education (UK).

Belsley, D.A., Kuh, E. and Welsch, R.E., 1980. Detecting and assessing collinearity. Regression diagnostics: Identifying influential data and sources of collinearity, pp.85-191.

Belsley, D.A., Kuh, E. and Welsch, R.E., 1980. Identifying influential data and sources of collinearity. Regression Diagnostics.

Berenbeim, R., 2004. Corporate Governance. Vital Speeches of the Day, 71(3), p.87.

Berry-Stoelzle, T. R. and J. Xu, 2016, Enterprise Risk Management and the Cost of Capital, *Journal of Risk and Insurance* (forthcoming).

Bertinetti, G.S., Cavezzali, E. and Gardenal, G., 2013. The effect of the enterprise risk management implementation on the firm value of European companies. Department of Management, Università Ca'Foscari Venezia Working Paper, (10).

Bhaskar, R. Reclaiming Reality. London: Verso, 1989

Bini, E., Garavini, G. and Romero, F. eds., 2016. Oil shock: The 1973 crisis and its economic legacy. Bloomsbury Publishing.

Blakeley, G., Dutta, S.J. and Wiedenbrug, A., 2019. The global financial crisis and its history: responses to Adam Tooze's Crashed.

Bloomberg, N.E.F., 2019. New energy outlook 2018. Bloomberg New Energy Finance: New York, NY, USA.

Bohnert, A., Gatzert, N., Hoyt, R.E. and Lechner, P., 2017. The relationship between enterprise risk management, value and firm characteristics based on the literature. Zeitschrift für die gesamte Versicherungswissenschaft, 106(3-4), pp.311-324.

Bohnert, A., Gatzert, N., Hoyt, R.E. and Lechner, P., 2019. The drivers and value of enterprise risk management: evidence from ERM ratings. *The European Journal of Finance*, 25(3), pp.234-255.

Bohnert, A., Gatzert, N., Hoyt, R.E., Lechner, P.: The Drivers and Value of Enterprise Risk Management: Evidence from ERMRatings.Working Paper Version June 2017. Department of Insurance Economics and Risk Management, Friedrich-Alexander University, Erlangen-Nürnberg (2017)

Bond, S., 1993. Experimental research nursing: necessary but not sufficient. Nursing, Art and Science, Chapman and Hall, London.

Borman, D., 2017. Statistics 101: From Data Analysis And Predictive Modeling To Measuring Distribution And Determining Probability, Your Essential Guide To Statistics. A Comprehensive Guide to Statistics. 1st ed. Adams Media.

Bowling, D.M. and Rieger, L., 2005. Success factors for implementing enterprise risk management: building on the COSO framework for enterprise risk management to reduce overall risk. Bank Accounting & Finance, 18(3), pp.21-27.

BP, 2018. BP Annual Report. [Online] London: BP. Available at: https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/investors/bp-annual-report-and-form-20f-2018.pdf.

Brannan, M.J. and Oultram, T., 2012. Participant observation 17. Qualitative organizational research: Core methods and current challenges, p.296.

Branson, B.C., 2010. The role of the board of directors and senior management in enterprise risk management. In Enterprise risk management.

Bromiley, P., McShane, M., Nair, A. and Rustambekov, E., 2015. Enterprise risk management: Review, critique, and research directions. Long range planning, 48(4), pp.265-276.

Brower, D., 2020. US energy sector, shunned by investors, has 'Pearl Harbor' moment. Financial Times, [online] Available at: https://www.ft.com/content/254bf634-5677-11ea-abe5-8e03987b7b20.

Brown, C.H., 1983. Asymptotic comparison of missing data procedures for estimating factor loadings. Psychometrika, 48(2), 269-292.

Brown, N.C., Pott, C. and Wömpener, A., 2014. The effect of internal control and risk management regulation on earnings quality: Evidence from Germany. *Journal of Accounting and Public Policy*, 33(1), pp.1-31.

Bryman, A. and Bell, E., 2001. The nature of qualitative research. Social research methods, pp.365-399.

Bryman, A. and Cramer, D., 2009. Quantitative data analysis with SPSS 14, 15 & 16: A guide for social scientists. Routledge/Taylor & Francis Group.

Bryman, A., 1998. Quantitative and qualitative research strategies in knowing the social world.

Bryman, A., 2012. Sampling in qualitative research. Social research methods, 4, pp.415-429.

Bryman, A., & Bell, E., 2011. Business research methods. 3rd ed. Cambridge; New York, NY: Oxford University Press.

Buchanan, L., 2004. Breakthrough ideas for 2004. Harvard Business Review 2, 13e16.

Burrell, G., G. Morgan. 1979. Sociological paradigms and organizational analysis.

Caldwell, F., 2008. Risk intelligence: applying KM to information risk management. Vine.

Callahan, C. and Soileau, J., 2017. Does enterprise risk management enhance operating performance?. Advances in accounting, 37, pp.122-139.

Campbell, S., 2005. Determining overall risk. *Journal of Risk Research*, 8, 569–581

Carter, R.L., 2006. Solutions for Missing Data in Structural Equation Modeling. Research & Practice in Assessment, 1, pp.4-7.

CAS, 2003a. Overview of Enterprise Risk Management. From: http://www.casact.org/area/erm/overview.pdf.

Casualty Actuarial Society, 2001. Foundations of casualty actuarial science. Casualty Actuarial Society.

Chapman, P.M., Wang, F., Janssen, C., Persoone, G. and Allen, H.E., 1998. Ecotoxicology of metals in aquatic sediments: binding and release, bioavailability, risk assessment, and remediation. *Canadian Journal of Fisheries and Aquatic Sciences*, 55(10), pp.2221-2243.

Chen, Y.L., Chuang, Y.W., Huang, H.G. and Shih, J.Y., 2019. The value of implementing enterprise risk management: Evidence from Taiwan's financial industry. *The North American Journal of Economics and Finance*, p.100926.

Chen, J., Jiao, L. and Harrison, G., 2019. Organisational culture and enterprise risk management: The Australian not-for-profit context. Australian Journal of Public Administration, 78(3), pp.432-448.

Cherryholmes, C.H., 1992. Notes on pragmatism and scientific realism. Educational researcher, 21(6), pp.13-17.

Chong, I.G. and Jun, C.H., 2005. Performance of some variable selection methods when multicollinearity is present. Chemometrics and intelligent laboratory systems, 78(1-2), pp.103-112.

Chung, K.H. and Pruitt, S.W., 1994. A simple approximation of Tobin's q. Financial Management, pp.70-74.

Cicchetti, D.V. and Sparrow, S.A., 1981. Developing criteria for establishing interrater reliability of specific items: applications to assessment of adaptive behavior. *American journal of mental deficiency*.

Cochran, W. G., 1963, Sampling Techniques (John Wiley & Sons, 1963).

Cohen, D., 2007. Methods in cultural psychology.

Cohn, L.D. and Becker, B.J., 2003. How meta-analysis increases statistical power. Psychological methods, 8(3), p.243.

Collier, P.M., 2009. Fundamentals of risk management for accountants and managers. Routledge.

Collier, P.M., Collier, P.M., Berry, A.J., Berry, A. and Burke, G.T., 2006. Risk and management accounting: best practice guidelines for enterprise-wide internal control procedures (Vol. 2, No. 11). Elsevier.

Colquitt, L.L., Hoyt, R.E. and Lee, R.B., 1999. Integrated risk management and the role of the risk manager. Risk Management and Insurance Review, 2(3), pp.43-61.

Committee of Sponsoring Organization of the Treadway Commission., 2017. Enterprise Risk Management: Aligning Risk with Strategy and Performance, available at: http://erm.coso.org/Pages/viewexposuredraft.aspx.

Committee of Sponsoring Organizations of the Treadway Commission, 2013. Internal Control-Integrated Framework: Internal Control Over External Financial Reporting: a Compendium of Approaches and Examples. Committee of Sponsoring Organizations of the Treadway Commission.

Committee of Sponsoring Organizations of the Treadway Commission., 2004. Enterprise Risk Management – Integrated Framework, available at: http://coso.org/-ERM.htm.

Converse, J.M. and Presser, S., 1986. Survey questions: Handcrafting the standardized questionnaire (No. 63). Sage.

Cook, T.D. and Reichardt, C.S., 1979. Qualitative and quantitative methods in evaluation.

Cooper, D. and Schindler, P., 2014. Business Research Methods. 12th Ed. New York: McGraw-Hill/Irwin.

Cooper, T., Faseruk, A. and Khan, S., 2013. Examining practitioner studies to explore ERM and organizational culture. Journal of management policy and practice, 14(1), pp.53-68.

Corbett, M., 2013. Oil Shock of 1973–74. Federal Reserve History, 22.

COSO, 2004. Enterprise Risk Management Framework. Retrieved September, from. http://www.coso.org/documents/COSO_ERM_ExecutiveSummary.pdf.

Couper, M.P., Traugott, M.W. and Lamias, M.J., 2001. Web survey design and administration. Public opinion quarterly, 65(2), pp.230-253.

Creswell, J.W., 2009. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 3rd edn, Sage Publications, Thousand Oaks, California

Creswell, J.W. and Clark, P., 2007. Designing and conducting mixed methods research. In Thousand Oaks, CA: Sage IOP Conf. Series: Earth and Environmental Science (Vol. 385, p. 012039).

Creswell, J.W. and Plano Clark, V.L., 2011. Choosing a mixed methods design. Designing and conducting mixed methods research, 2, pp.53-106.

Crockford, N., 1980. An Introduction to Risk Management. Woodhead-Faulkner, Cambridge.

Cronbach, L.J., 1951. Coefficient alpha and the internal structure of tests. Psychometrika, 16(3), pp.297-334.

Crossan, F., 2003. Research philosophy: towards an understanding. Nurse Researcher (through 2013), 11(1), p.46.

Crotty, M., 1998. The foundations of social research: Meaning and perspective in the research process. Sage.

Cumming, C.M., and Hirtle, B.J. 2001. "The Challenges of Risk Management in Diversified Financial Companies." FRBNY Economic Policy Review, March.

Damodaran, A., 2002. Relative Valuation. Investment Valuation.

Danermark, B., 2001. Explaining Society: An Introduction to Critical Realism in the Social Sciences Routledge. Florence, Ky.

D'Arcy, S.P., Brogan, J.C., 2001. Enterprise risk management. *Journal of Risk Management of Korea* 12 (1), 207e228.

Daud, W.N.W., Haron, H. and Ibrahim, D.N., 2011. The role of quality board of directors in enterprise risk management (ERM) practices: Evidence from binary logistic regression. *International Journal of Business and Management*, 6(12), p.205.

Daud, W.N.W., Yazid, A.S., Malaysia, U.D.I. and HUSSIN, M.R., 2009. Determinants of Enterprise Risk Management (ERM) Adoption among Malaysian Companies. Universiti Teknologi MARA, Shah Alam Selangor, MALAYSIA.

Daud, W.N.W.D., Yazid, A.S. and Hussin, M.R., 2010. The effect of chief risk officer (CRO) on enterprise risk management (ERM) practices: Evidence from Malaysia. *International Business & Economics Research Journal (IBER),* 9(11).

Deloach, J., Temple, N., 2000. Enterprise Wide Risk Management Strategies for Linking Risk & Opportunity. Financial Times.

Deloitte Touche Thomas, 2012, Global Management Risk Survey, Eight Edition, Setting A Higher Bar, Deloitte Global Services Limited.

Deloitte, 2014. Risk Intelligence in the Energy & Resources Industry: Enterprise Risk Management Benchmark Survey. 2nd ed. Deloitte Touche Tohmatsu Limited. From: https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Energy-and-Resources/gx-er-erm-survey.pdf.

Deloitte, 2015. Global Risk Management Survey, 9th edition. Retrieved from: https://dupress.deloitte.com/dup-us-en/topics/risk-management/global-risk-management-surveyfinancial-services.html.

Deloitte, 2018. Global Risk Management Survey, 11Th Edition - Deloitte. 11th ed. Deloitte. Available at: https://www2.deloitte.com/content/dam/Deloitte/co/Documents/risk/DI_global-risk-management-survey.pdf.

Deloitte, 2020. *Weekly Global Economic Update*. [Online] Deloitte. Available at: https://www2.deloitte.com/us/en/insights/economy/global-economic-outlook/weekly-update.html.

Deragon, J., 2000. Old Knowledge with a New Name. Retrieved November, from: http://riskmania.com/pdsdata/Old%20Knowledge%20With%20a%20New% 20Name-erisk.pdf.

Desender, K. and Lafuente, E., 2009. The influence of board composition, audit fees and ownership concentration on enterprise risk management. Paper. Oktober.

Desender, K., 2011. On the determinants of enterprise risk management implementation. In Enterprise IT governance, business value and performance measurement (pp. 87-100). IGI Global.

Deviant, S., 2014. The Practically Cheating Statistics Handbook.

Dickinson, G., 2001. Enterprise risk management: Its origins and conceptual foundation. The Geneva Papers on Risk and Insurance. Issues and Practice, 26(3), pp.360-366.

Dictionary, C., 2013. Risk. CD Online [Internet].

Dictionary, O., 2016. Risk definition. From: http://www. Oxforddictionaries. com/definition/english/risk.

Dillman, D.A., 2011. Mail and Internet surveys: The tailored design method--2007 update with new Internet, visual, and mixed-mode guide. John Wiley & Sons.

Dillman, D.A., Smyth, J.D. and Christian, L.M., 2014. Internet, phone, mail, and mixed-mode surveys: the tailored design method. John Wiley & Sons.

Dionne, G., 2013. Risk management: History, definition, and critique. Risk Management and Insurance Review, 16(2), pp.147-166.

Dover, 2015. Dover. [Online] New York. Available at: https://investors.dovercorporation.com/static-files/b2e0c0c9-7fc3-482e-a4e0-3fc7af94e4ef.

Draper, N.R. and Smith, H., 1981. Applied Regression Analysis, John Wiley and Sons. New York, 407.

Dubois, A. and Gadde, L.E., 2002. Systematic combining: an abductive approach to case research. *Journal of business research*, 55(7), pp.553-560.

Dudovskiy, J., 2018. Constructivism research philosophy. Research methodology.

Duong, L. and Evans, J., 2015. CFO compensation: evidence from Australia. *Pacific-Basin Finance Journal*, 35, pp.425-443.

Easterby-Smith, M. and Thorpe, R., 1997. Research traditions in management learning. Management learning: Integrating perspectives in theory and practice, pp.38-53.

Easterby-Smith, M., Thorpe, R. and Lowe, A., 1991. Introduction to management research.

Easton, G., 2010. Critical realism in case study research. Industrial marketing management, 39(1), pp.118-128.

Eckles, D.L., Hoyt, R.E. and Miller, S.M., 2014. Reprint of: The impact of enterprise risk management on the marginal cost of reducing risk: Evidence from the insurance industry. *Journal of Banking & Finance*, 49, pp.409-423.

Economist Intelligence Unit, 2005. CEO Briefing-Corporate priorities for 2005. [Online] Available at:
http://graphics.eiu.com/files/ad_pdfs/CEO_BRIEFING_2005_WP.pdf.

Eikenhout, L.C.A., 2015. Risk management and performance in insurance companies (Master's thesis, University of Twente).

Ernst, N. and Young, Y.C., 2012. Turning Risk into Results: How Leading Companies Use Risk Management to Fuel Better Performance.

ERYILMAZ, M., 2018. Enterprise Risk Management: Past, Today and Future. Social Sciences Researches in the Globalizing World, p.244.

Everett, C., 2011. A risky business: ISO 31000 and 27005 unwrapped. Computer Fraud & Security, 2011(2), pp.5-7.

Fama, E.F. and Jensen, M.C., 1983. Separation of ownership and control. The journal of law and Economics, 26(2), pp.301-325.

Farrar, D.E. and Glauber, R.R., 1967. Multicollinearity in regression analysis: the problem revisited. The Review of Economic and Statistics, pp.92-107.

Farrell, M. and Gallagher, R., 2015. The valuation implications of enterprise risk management maturity. *Journal of Risk and Insurance*, 82(3), pp.625-657.

Fattouh, B., 2010. The dynamics of crude oil price differentials. *Energy Economics*, *32*(2), pp.334-342.

Fattouh, B., Kilian, L. and Mahadeva, L., 2013. The role of speculation in oil markets: What have we learned so far?. *The Energy Journal*, 34(3).

Field, A., 2018. Andy. Discovering Statistics Using IBM SPSS Statistics.

Fleetwood, S., 2004. The ontology of organisation and management studies. In S. Fleetwood & S. Ackroyd (Eds.), Realism in action in management and organisation studies. London: Routledge.

Florio, C. and Leoni, G., 2017. Enterprise risk management and firm performance: The Italian case. The British Accounting Review, 49(1), pp.56-74.

Foster, G. 1978, Financial Statement Analysis, (Prentice Hall 1978).

Fraser, J. and Simkins, B. eds., 2010. Enterprise risk management: Today's leading research and best practices for tomorrow's executives (Vol. 3). John Wiley & Sons.

Fraser, J.R. and Simkins, B.J., 2016. The challenges of and solutions for implementing enterprise risk management. Business horizons, 59(6), pp.689-698.

Fraser, J.R., Schoening-Thiessen, K., Simkins, B.J., 2008. Who reads what most often? A survey of enterprise risk management literature read by risk executives. J. Applied Finance 18, 73-91.

Frecka, T.J. and Hopwood, W.S., 1983. The effects of outliers on the cross-sectional distributional properties of financial ratios. Accounting Review, pp.115-128.

Frigo, M.L. and Anderson, R.J., 2014. Risk management frameworks: adapt, don't adopt: here's a primer on how to use two well-known approaches. Strategic Finance, 95(7), pp.49-54.

Froot, K.A., Scharfstein, D.S. and Stein, J.C., 1993. Risk management: Coordinating corporate investment and financing policies. *The Journal of Finance*, 48(5), pp.1629-1658.

Gareth, M. and Smircich, L., 1980. The case for qualitative research. Academy of Management Review, 5, p.4.

Garside, T. and Nakada, P., 2000. Enhancing risk measurement capabilities. Balance Sheet, 8(3), pp.12-17.

Gates, S. and Hexter, E., 2005. From Risk Management to Risk Strategy, the Conference Board.

Gates, S., 2006. Incorporating strategic risk into enterprise risk management: A survey of current corporate practice. *Journal of Applied Corporate Finance*, 18(4), pp.81-90.

Gates, S., Nicolas, J.L. and Walker, P.L., 2012. Enterprise risk management: A process for enhanced management and improved performance.

Gatzert, N. and Martin, M., 2015. Determinants and value of enterprise risk management: Empirical evidence from the literature. Risk Management and Insurance Review, 18(1), pp.29-53.

Geessink, L., 2012. Enterprise risk management and bank performance during a financial crisis (Master's thesis, University of Twente).

Gelo, O., Braakmann, D. and Benetka, G., 2008. Quantitative and qualitative research: Beyond the debate. Integrative psychological and behavioural science, 42(3), pp.266-290.

Gilje, E.P. and Taillard, J.P., 2017. Does hedging affect firm value? Evidence from a natural experiment. The Review of Financial Studies, 30(12), pp.4083-4132.

Gjerdrum, D. and Peter, M., 2011. The new international standard on the practice of risk management–A comparison of ISO 31000: 2009 and the COSO ERM framework. Risk management, 31(21), pp.8-12.

Gliem, J.A. and Gliem, R.R., 2003. Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type scales. Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education.

Golshan, N.M. and Rasid, S.A., 2012. Determinants of enterprise risk management adoption: An empirical analysis of Malaysian public listed firms. *International Journal of Social and Human Sciences*, 6(2012), pp.119-126.

Gordon, L.A., Loeb, M.P. and Tseng, C.Y., 2009. Enterprise risk management and firm performance: A contingency perspective. *Journal of accounting and public policy*, 28(4), pp.301-327.

Gordon, L.A., Loeb, M.P., Tseng, and C.-Y.: Enterprise risk management and firm performance: a contingency perspective. J. Account. Public Policy 28(4), 301–327 (2009)

Goyal, V.K. and Park, C.W., 2002. Board leadership structure and CEO turnover. *Journal of Corporate finance*, 8(1), pp.49-66.

Grace, M.F., 2010. The insurance industry and systemic risk: Evidence and discussion. Networks Financial Institute Policy Brief, (2010-PB), p.02.

Grace, M.F., Leverty, J.T., Phillips, R.D. and Shimpi, P., 2015. The value of investing in enterprise risk management. *Journal of Risk and Insurance*, *82*(2), pp.289-316.

Grant, N., 2017. Gulf Coast Oil Spill May Be Largest Since 2010 BP Disaster. Bloomberg, [online] Available at: https://www.bloomberg.com/news/articles/2017-10-16/gulf-of-mexico-oil-spill-may-be-largest-since-2010-bp-disaster.

Green, P., 2001, Risk Managers Cover Enterprise Exposure, Global Finance, 15: 72-74.

Gregson, G., 2019. Financial Enterprise Risk Management. Annals of Actuarial Science, 13(1), pp.217-218.

Grix, J., 2018. The foundations of research. Macmillan International Higher Education.

Guarino, N., Oberle, D. and Staab, S., 2009. What is an ontology?. In Handbook on ontologies (pp. 1-17). Springer, Berlin, Heidelberg.

Guay, W. and Kothari, S.P., 2003. How much do firms hedge with derivatives?. *Journal of financial economics,* 70(3), pp.423-461.

Guba, E.G. and Lincoln, Y.S., 1994. Competing paradigms in qualitative research. Handbook of qualitative research, 2(163-194), p.105.

Guney, Y., Ahmed, H. and Azevedo, A., 2020. The effect of hedging on firm value and performance: Evidence from the nonfinancial UK firms.

Gyöngyi Kovács Karen M. Spens, (2005),"Abductive reasoning in logistics research", International *Journal of Physical Distribution & Logistics Management*, Vol. 35 Iss 2 pp. 132 – 144.

Haimes, Y.Y., 1992. Toward a holistic approach to total risk management. The Geneva Papers on Risk and Insurance 17 (64), 314e321.

Hampton, J., 2014. Fundamentals of enterprise risk management: How top companies assess risk, manage exposure, and seize opportunity. Amacom.

Handy, C (1999) Beyond Certainty, Harvard Business School Press, Boston, MA

Hanson, D. and Grimmer, M., 2007. The mix of qualitative and quantitative research in major marketing journals, 1993-2002. *European journal of marketing*.

Harrington, S.E., Niehaus, G. and Risko, K.J., 2002. Enterprise risk management: the case of united grain growers. *Journal of Applied Corporate Finance*, 14(4), pp.71-81.

Havenga, A. and Venter, P., 2007. The perceived value of Enterprise Risk Management in the South African business environment. Southern African Business Review, 11(3), pp.74-94.

Head, G.L., 1973. Teaching Risk Management as a Decision Process. A Review of the New IIA Program in Risk Management. *The Journal of Risk and Insurance*, 40(1), pp.149-151.

Hengl, T., Heuvelink, G.B. and Stein, A., 2004. A generic framework for spatial prediction of soil variables based on regression-kriging. Geoderma, 120(1-2), pp.75-93.

Hesse-Biber, S.N. and Johnson, R.B. eds., 2015. The Oxford handbook of multimethod and mixed methods research inquiry. Oxford University Press.

Hetland, P.W., 2003. CHAPTER EIGHT Uncertainty management. In *Appraisal, Risk and Uncertainty: Construction Management Series* (pp. 59-88). Thomas Telford Publishing.

Hill, R., 1998. What sample size is "enough" in internet survey research. Interpersonal Computing and Technology: An electronic journal for the 21st century, 6(3-4), pp.1-12.

HM Treasury, 2004. Orange Book: Management of Risk – Principles and Concepts, www.hm-treasury.gov.uk

Hoffman, D.G., 2002. Managing operational risk: 20 firm wide best practice strategies (Vol. 109). John Wiley & Sons.

Holton, G.A., 1996. Closed Form Value at Risk. Contingency Analysis, from. http://www.contingencyanalysis.com/frame/framevar.htm.

Hopkin, P., 2012. Fundamentals of risk management: understanding, evaluating and implementing effective risk management. 2nd ed. London: Kogan Page Limited.

Hopkin, P., 2018. Fundamentals of risk management: understanding, evaluating and implementing effective risk management. Kogan Page Publishers.

Horvey, S.S. and Ankamah, J., 2020. Enterprise risk management and firm performance: Empirical evidence from Ghana equity market. Cogent Economics & Finance, 8(1), p.1840102.

Hoyos, C., 2010. Recession hits oil and gas production. Financial Times, [online] Available at: https://www.ft.com/content/e0db0b90-0099-11df-ae8d-00144feabdc0.

Hoyt, R.E. and Khang, H., 2000. On the demand for corporate property insurance. *Journal of Risk and Insurance*, pp.91-107.

Hoyt, R.E. and Liebenberg, A.P., 2008, January. The value of enterprise risk management: Evidence from the US insurance industry. In an unpublished paper, accessed at:

http://www. Aria. org/meetings/2006papers/Hoyt_Liebenberg_ERM_070606.

Hoyt, R.E. and Liebenberg, A.P., 2011. The value of enterprise risk management. *Journal of Risk and Insurance,* 78(4), pp.795-822.

Hoyt, R.E. and Liebenberg, A.P., 2015. Evidence of the value of enterprise risk management. *Journal of Applied Corporate Finance*, 27(1), pp.41-47.

Hsu, C.C., Kannan, V.R., Tan, K.C. and Leong, G.K., 2008. Information sharing, buyer-supplier relationships, and firm performance. International Journal of Physical Distribution & Logistics Management.

Hughes, J.A. and Sharrock, W.W., 1997. The Philosophy of Social Research. (3rd edn) Harlow. Essex: Addison Wesley Longman Ltd.

Hughes, J.A. and Sharrock, W.W., 2016. The philosophy of social research. Routledge.

Hutson, Elaine & Laing, Elaine & Ye, Min, 2019. "Mutual fund ownership and foreign exchange risk in Chinese firms," *Journal of International Financial Markets, Institutions and Money, Elsevier*, vol. 60(C), pages 169-192.

Ibadin, P.O. and Dabor, E.L., 2015. Corporate governance and accounting quality: empirical investigations from Nigeria. *Journal of Policy and Development Studies*, 289(1850), pp.1-19.

IBM.com. 2020. IBM Knowledge Center. [Online] Available at: https://www.ibm.com/support/knowledgecenter/SSEP7J_11.1.0/com.ibm.swg.ba.cognos.ug_ca_dshb.doc/rsquared_adjusted.html.

IEA., 2019. World Energy Outlook 2019, IEA, Paris. Available at: https://www.iea.org/reports/world-energy-outlook-2019

IFAC., 2018. Enabling the Accountant's Role in Effective enterprise.

IFAC, 1999. Enhancing shareholder wealth by better managing business risk (Vol. 9). Intl Federation of Accounts.

IIA, 2001. Risk or Opportunity - the Choice Is Yours Retrieved. September, from. http://usfweb2.usf.edu/uac/documents/riskparadigm.pdf.

IIA, 2020. Risk Management And Internal Audit: Forging A Collaborative Alliance RIMS And The Institute Of Internal Auditors Joint Report Highlights The Advantages Of Internal Audit And Risk Management Collaboration. [Online] Available at: https://na.theiia.org/news/press-releases/Pages/Risk-Management-and-Internal-Audit-Forging-a-Collaborative-Alliance.aspx.

Institute of Internal Auditors. 2009, IIA Position Paper: The Role of Internal Auditing In Enterprise-Wide Risk Management. Revised: January 2009 ERM PP.

Institute of Internal Auditors., 2004a, the role of internal auditing in enterprise risk management, retrieved from:

http://www.theiia.org/guidance/standards-andpractices/position-papers/current-position-papers.

Institute of Internal Auditors. 2004b, COSO releases new ERM Framework, retrieved from: http://www.theiia.org/guidance/additional-resources/coso-relatedresources/coso-releases-new-erm-framework.

Institute of Risk Management (IRM), 2018a. From the cube to the rainbow double helix: a risk practitioner's guide to the COSO ERM Frameworks. Institute of Risk Management, London.

Institute of Risk Management (IRM), 2018b. A Risk Practitioners Guide to ISO 31000: 2018. Institute of Risk Management, London.

International Organization for Standardization Technical Committee, 2018. Risk Management-Guidelines (Standard No. ISO 31000: 2018). Washington, DC: International Organization for Standardization Retrieved from: https://www.iso.org/obp/ui/#iso:std:iso:31000:ed-2:v1:en.

International Monetary Fund, 2020. *The Great Lockdown: Worst Economic Downturn Since The Great Depression*. [online] IMF. Available at: https://blogs.imf.org/2020/04/14/the-great-lockdown-worst-economic-downturn-since-the-great-depression/.

IRGC (International Risk Governance Council)., 2005. Risk Governance – Towards an Integrative Approach, White Paper no 1, Renn O. with an Annex by P. Graham, Geneva: IRGC.

Isaac, S. and Michael, W.B., 1995. Handbook in research and evaluation: A collection of principles, methods, and strategies useful in the planning, design, and evaluation of studies in education and the behavioural sciences. Edits publishers.

ISO., 2002. Risk Management Vocabulary. ISO/IEC Guide 73.

ISO., 2009. Risk Management – Principles and guidelines, ISO 31000:2009.

ISO 31000, 2010. Risk Management Principles and Guidelines. From: http://www.iso.org/iso/home/standards/iso31000.htm

ISO, 2009. 31000: 2009 Risk management Principles and Guidelines. Sydney, NSW: International Organization for Standardization. Standards Association of Australia.

ISO., 2009. International Standard: Risk Management: Principles and Guidelines. ISO 31000. Principes Et Lignes Directrices. ISO.

Jalal, A., AlBayati, F.S. and AlBuainain, N.R., 2011. Evaluating enterprise risk management (ERM); Bahrain financial Sectors as a case study. International Business Research, 4(3), p.83.

Jensen, M.C., 1993, "Presidential Address: The Modern Industrial Revolution, Exit, and the Failure of Internal Control Systems," *Journal of Finance* (July), 831-880.

Jia, F. and Jobbling, P., 1998. Expenditure and Cash Flow Forecasting Using an Integrated Risk, Time and Cost Model. *International Journal of Project and Business Risk Management*, 2(4).

Jílek, J. (2000). Financial risks. Praha: Grada.

Jin, F.E., 2001. Poor risk management causes ailing firms' downfall. Business Times.

Jin, Y. and Jorion, P., 2006. Firm value and hedging: Evidence from US oil and gas producers. *The journal of Finance*, 61(2), pp.893-919.

Jin, Y. and Jorion, P., 2007. Does hedging increase firm value? Evidence from the gold mining industry. In Working Paper, California State University-Northridge and University of California-Irvine. (NO, Effect)

Julious, S.A., 2005. Sample size of 12 per group rule of thumb for a pilot study. Pharmaceutical Statistics: *The Journal of Applied Statistics in the Pharmaceutical Industry*, 4(4), pp.287-291.

Júnior, J.L.R. and Laham, J., 2008. The impact of hedging on firm value: evidence from Brazil. *Journal of International Finance and Economics*, 8(1), pp.76-93.

Kanhai, C. and Ganesh, L., 2014. Factors influencing the adoption of enterprise risk management (ERM) practices by banks in Zimbabwe. *International Journal of Business and Commerce*, 3(6), pp.1-17.

Kaplan, R. S., & Mikes, A., 2012. Managing risks: A new framework. Harvard Business Review, 90(6): 48- 60.

Kaplan, R. S. and Norton, D. P. 1996. Using the balanced scorecard as a strategic management system. Harvard Business Review, 74(1), 75-85.

Karch, J., 2019. Improving on Adjusted R-squared.

Kasim, M.A.B. and Hanafi, S.R.B.M., 2012. The Enterprise Risk Management (ERM) and role of internal auditors in the ERM implementation: A review of related literature on measurement instruments. *African Journal of Business Management*, 6(36), p.9883.

Kasuya, E., 2019. On the use of r and r squared in correlation and regression. Ecological Research, 34(1).

Khamis, M., 2010. The Impact of the Global Financial Crisis on the GCC Region: Lessons and Reform Priorities. 1st ed. [ebook] Doha: OECD. Available at: https://www.oecd.org/mena/competitiveness/privatesectorinitiatives/46758795.pdf

Khan, M.J., Hussain, D. and Mehmood, W., 2016. Why do firms adopt enterprise risk management (ERM)? Empirical evidence from France. Management Decision.

Khediri, K.B. and Folus, D., 2010. Does hedging increase firm value? Evidence from French firms. Applied Economics Letters, 17(10), pp.995-998.

Khikmah, L., Wijayanto, H. and Syafitri, U., 2017, April. Modeling Governance KB with CATPCA to Overcome Multicollinearity in the Logistic Regression. In J. Phys. Conf. Ser (Vol. 824, p. 012027).

Khumairoh, N.A. and Agustina, L., 2017. The Roles of the Board of Commissioner in Moderating Factors Affecting the Disclosure of Enterprise Risk Management. Accounting Analysis Journal, 6(3), pp.445-457.

Kim, H.Y., 2013. Statistical notes for clinical researchers: assessing normal distribution (2) using skewness and kurtosis. Restorative dentistry & endodontics, 38(1), pp.52-54.

Kimbrough, R.L. and Componation, P.J., 2009. The relationship between organizational culture and enterprise risk management. *Engineering Management Journal*, 21(2), pp.18-26.

King, M.R. and Santor, E., 2008. Family values: Ownership structure, performance and capital structure of Canadian firms. *Journal of Banking & Finance*, 32(11), pp.2423-2432.

Kirkpatrick, G., 2009. The corporate governance lessons from the financial crisis. *OECD Journal*: Financial Market Trends, 2009(1), pp.61-87.

Kleffner, A.E., Lee, R.B. and McGannon, B., 2003. The effect of corporate governance on the use of enterprise risk management: Evidence from Canada. Risk Management and Insurance Review, 6(1), pp.53-73.

Kloman, H.F., 1992. Rethinking risk management. The Geneva Papers on Risk and Insurance-Issues and Practice 17 (3), 299e313.

Kolmogorov, A., 1933. Sulla determinazione empirica di una lgge di distribuzione. Inst. Ital. Attuari, Giorn. 4, pp.83-91.

KPMG, 2015. Risk Management and Regulation – The Boardroom Perspective. 24th Annual Insurance Issues Conference. [Online] Canda: KPMG. Available at: https://home.kpmg/content/dam/kpmg/pdf/2016/05/Risk-management-and-regulation-The-boardroom-perspective.pdf.

KPMJ, 2019. Enterprise Risk Management- Beyond Regulatory Compliance- Enabling Sustainable Value Creation. 1st ed. Switzerland. Available at: https://assets.kpmg/content/dam/kpmg/ch/pdf/enterprise-risk-management-insurance-en.pdf.

Kraus, V. and Lehner, O.M., 2012. The nexus of enterprise risk management and value creation: A systematic literature review. *ACRN Journal of Finance and Risk Perspectives*, 1(1), pp.91-163.

Kumamoto, H., Henley, E., (1996). Probabilistic Risk Assessment and Management for Engineers and Scientists, IEEE Press, ISBN-13: 978-0780360174

Kummer, S. and Pauletto, C., 2012, May. The history of derivatives: A few milestones. In EFTA Seminar on Regulation of Derivatives Markets (pp. 431-466).

Lai, F.W., Azizan, N.A. and Samad, M.F., 2010. A theoretical appraisal of value maximizing enterprise risk management. International Journal of Accounting Information Science and Leadership, 3(6), pp.23-41.

Lam, J., 2001. The CRO is here to stay. Risk Management, 48(4), pp.16-16.

Lam, J., 2006. Managing risk across the enterprise: Challenges and benefits. In Risk Management (pp. 3-19). Academic Press.

Lam, J., 2017. Implementing enterprise risk management: From methods to applications. John Wiley & Sons.

Lang, L.H. and Stulz, R.M., 1994. Tobin's q, corporate diversification, and firm performance. *Journal of political economy*, 102(6), pp.1248-1280.

Lawson, T. Economics and Reality. London: Routledge, 1997

Lechner, P. and Gatzert, N., 2018. Determinants and value of enterprise risk management: empirical evidence from Germany. *The European Journal of Finance*, 24(10), pp.867-887.

Leitch, M., 2010. ISO 31000: 2009—the new international standard on risk management. Risk Analysis: *An International Journal*, 30(6), pp.887-892.

Leontitsis, A. and Pagge, J., 2007. A simulation approach on Cronbach's alpha statistical significance. Mathematics and Computers in Simulation, 73(5), pp.336-340.

Liao, S.W., 2012. Does ERM (Enterprise Risk Management) Help Firm's Performance in Times of Crisis. University of Amsterdam, Amsterdam Business School, Master in International Finance.

Liebenberg, A.P. and Hoyt, R.E., 2003. The determinants of enterprise risk management: Evidence from the appointment of chief risk officers. Risk management and insurance review, 6(1), pp.37-52.

Liesch, P.W., Welch, L.S. and Buckley, P.J., 2014. Risk and uncertainty in internationalisation and international entrepreneurship studies. In The multinational enterprise and the emergence of the global factory (pp. 52-77). Palgrave Macmillan, London.

Lifson, M.W. and Shaifer, E.F., 1982. Decision and Risk Analysis for Construction Management. John Wiley & Sons, Inc., 605 Third Ave., New York, NY 10158. 1982.

Lin, Y., Wen, M.M. and Yu, J., 2012. Enterprise risk management: Strategic antecedents, risk integration, and performance. *North American Actuarial Journal*, 16(1), pp.1-28.

Lincoln, Y.S., Lynham, S.A. and Guba, E.G., 2011. Paradigmatic controversies, contradictions, and emerging confluences, revisited. The Sage handbook of qualitative research, 4, pp.97-128.

Lindenberg, E.B. and Ross, S.A., 1981. Tobin's q ratio and industrial organization. *Journal of business*, pp.1-32.

Lipton, M., Neff, D.A., Brownstein, A.R., Rosenblum, S.A., Emmerich, A.O., Fain, S.L. and Cohen, D.J., 2012, January. Risk Management and the Board of Directors–An Update for 2012. In The Harvard Law School Forum on Corporate Governance and Financial Regulation.

Lomax, R.G. and Hahs-Vaughn, D.L., 2013. An introduction to statistical concepts. Routledge.

Louisot, J.P. and Ketcham, C., 2014. ERM. *Enterprise Risk Management: Issues and Cases*.

Lu, Z., 2018. The influence of derivatives usage on firm value.

Lundqvist, S.A. and Vilhelmsson, A., 2018. Enterprise risk management and default risk: Evidence from the banking industry. *Journal of Risk and Insurance*, 85(1), pp.127-157.

Lundqvist, S.A., 2014. An exploratory study of enterprise risk management: Pillars of ERM. *Journal of Accounting, Auditing & Finance*, 29(3), pp.393-429.

Lundqvist, S.A., 2015. Why firms implement risk governance–Stepping beyond traditional risk management to enterprise risk management. *Journal of Accounting and Public Policy*, 34(5), pp.441-466.

MacDonald, M., 2002. Review of large public procurement in the UK [online]. HM Treasury, London. Available from:
http://www.parliament.vic.gov.au/images/stories/committees/paec/201011_Budget_E stimates/Extra_bits/Mott_McDonald_Flyvberg_Blake_Dawson Waldron_studies.pdf.

MacKay, P. and Moeller, S.B., 2007. The value of corporate risk management. *The Journal of Finance*, 62(3), pp.1379-1419.

Mackenzie, N. and Knipe, S., 2006. Research dilemmas: Paradigms, methods and methodology. Issues in educational research, 16(2), pp.193-205.

Maechler, A.M., Mitra, S. and Worrell, D., 2010. Decomposing financial risks and vulnerabilities in emerging Europe. IMF Staff Papers, 57(1), pp.25-60.

Maingot, M., Quon, T.K. and Zéghal, D., 2012. The effect of the financial crisis on enterprise risk management disclosures. *International Journal of Risk Assessment and Management*, 16(4), pp.227-247.

Malik, M.F., Zaman, M. and Buckby, S., 2020. Enterprise risk management and firm performance: Role of the risk committee. Journal of Contemporary Accounting & Economics, 16(1), p.100178.

Manab, N.A., Kassim, I. and Hussin, M.R., 2010. Enterprise-wide risk management (EWRM) practices: Between corporate governance compliance and value. International Review of Business Research Papers, 6(2), pp.239-252.

Mandelker, G., 1974. Risk and return: The case of merging firms. *Journal of financial economics*, 1(4), pp.303-335.

Manyem, S., 2015. S&P'S ERM Framework. McGraw HILL Financial. Available at: https://www.ultirisk.com/pdf/ultimate-risk-may-2015-sridahr-presentation.pdf.

Mardessi, S.M. and Arab, S.D.B., 2018. Determinants of ERM implementation: the case of Tunisian companies. *Journal of Financial Reporting and Accounting*.

Marks, N., 2015. World-Class Risk Management. CreateSpace.

Marr, B., and Schiuma, G (2008) Business Performance Measurement: Past, Present and Future. Management Decision 41

Martens, B. and Teuteberg, F., 2011. Risk and compliance management for cloud computing services: Designing a reference model. Risk, 8, pp.5-2011.

Matsumura, E.M. and Tucker, R.R., 1992. Fraud detection: A theoretical foundation. Accounting Review, pp.753-782.

Maury, B., 2006. Family ownership and firm performance: Empirical evidence from Western European corporations. *Journal of corporate finance,* 12(2), pp.321-341.

McCrae, M. and Balthazor, L., 2000. Integrating risk management into corporate governance: the Turnbull guidance. Risk management, 2(3), pp.35-45.

McEvoy, P. and Richards, D., 2006. A critical realist rationale for using a combination of quantitative and qualitative methods. *Journal of research in nursing*, 11(1), pp.66-78.

McKelvey, R.D. and Zavoina, W., 1975. A statistical model for the analysis of ordinal level dependent variables. *Journal of mathematical sociology*, 4(1), pp.103-120.

McKinsey and Co, 2013. Enterprise Risk Management: What's Different In the Corporate World and Why. 1st ed. McKinsey and Company. Available at: https://www.mckinsey.com/~/media/mckinsey/dotcom/client_service/risk/working%20papers/40_whats%20different%20in%20the%20corporate%20world.ashx.

McShane, M., 2018. Enterprise risk management: history and a design science proposal. *The Journal of Risk Finance*.

McShane, M.K., Nair, A. and Rustambekov, E., 2011. Does enterprise risk management increase firm value?. *Journal of Accounting, Auditing & Finance*, 26(4), pp.641-658.

Melichar, M. and Atems, B., 2019. Global crude oil market shocks and global commodity prices. OPEC Energy Review, 43(1), pp.92-105.

Mensah, G. and Gottwald, W., 2016. Enterprise risk management: Factors associated with effective implementation. Available at SSRN 2735096.

Merna, A. and Smith, N.J., 1996. Guide to the preparation and evaluation of build-own-operate-transfer (BOOT) project tenders. Asia Law & Practice Limited.

Merna, T. and Al-Thani, F.F., 2011. Corporate risk management. John Wiley & Sons.

Merriam, S.B., 1998. Qualitative Research and Case Study Applications in Education. Revised and Expanded from" Case Study Research in Education." Jossey-Bass Publishers, 350 Sansome St, San Francisco, CA 94104.

Merriam-Webster, Inc., 2013. The Merriam-Webster dictionary, Merriam-Webster, Inc., Springfield, MA

Merrill, K.R., 2007. *The Oil crisis of 1973-1974: a brief history with documents*. Bedford/St. Martin's.

Merton, R.C., 1974. On the pricing of corporate debt: The risk structure of interest rates. *The Journal of finance*, 29(2), pp.449-470.

Meulbroek, L.K., 2002. Integrated risk management for the firm: a senior manager's guide. Available at SSRN 301331.

Miccolis, J., 2000. Enterprise Risk Management in the Financial Services Industry: Still a Long Way to Go. Retrieved August, from: http://www.irmi.com/ expert/articles/2000/miccolis08.aspx.

Miccolis, J., 2002. The language of enterprise risk management: a practical glossary and discussion of relevant terms, concepts, models, and measures. Tillinghast-Towers Perrin. May.

Miccolis, J., 2003. ERM lessons across industries. Tillinghast-Towers Perrin report.

Mikes, A. and Kaplan, R.S., 2013. Towards a contingency theory of enterprise risk management (AAA 2014 Management Accounting Section–MAS, Meeting Paper). Tilburg, Netherlands: Tilburg University.

Mikes, A. and Kaplan, R.S., 2014, October. Towards a contingency theory of enterprise risk management. AAA.

Mikes, A., 2005. Enterprise risk management in action (Doctoral dissertation, London School of Economics and Political Science (United Kingdom).

Mikes, A., 2011. From counting risk to making risk count: Boundary-work in risk management. Accounting, organizations and society, 36(4-5), pp.226-245.

Miller, K.D., 1992. A framework for integrated risk management in international business. *Journal of international business studies*, 23(2), pp.311-331.

Miller, K.D., 1998. Economic exposure and integrated risk management. *Strategic Management Journal*, 19(5), pp.497-514.

MIL-STD-882D., 2000. DOD

Mitton, T., 2002. A cross-firm analysis of the impact of corporate governance on the East Asian financial crisis. *Journal of financial economics*, 64(2), pp.215-241.

Modigliani, F. and Miller, M.H., 1958. The cost of capital, corporation finance and the theory of investment. The American economic review, 48(3), pp.261-297.

Moeller, R.R., 2013. Executive's Guide to COSO Internal Controls: Understanding and Implementing the New Framework. John Wiley & Sons.

Moles, P. (1998). Financial risk management. Sources of financial risk and risk assessment. Edinburgh: Heriot-Watt University.

Moody's Analytics, Inc. 2012. Enterprise Risk Management. Available at: https://www.moodysanalytics.com/-/media/whitepaper/2012/2012-01-10-data-quality-banking.pdf.

Moosa, I.A., 2007. Operational risk management. New York: Palgrave Macmillan.

Morse, J.M., 1991. Approaches to qualitative-quantitative methodological triangulation. Nursing research, 40(2), pp.120-123.

Motocu, M., 2009. *Management riscului în economie.* Cluj-Napoca: Ed. Risoprint, 14.

Musyoki, D. and Komo, L., 2017. Risk factors and enterprise risk management in the financial services industry: a review of theory and evidence. *International Journal of Economics and Business Management*, 3(1), pp.29-45.

Munro, H., & Noori, H., 1988. Measuring Commitment to New Manufacturing Technology: Integrating Technology Puch and Marketing Pull. IEEE Trans. Eng. Manage, 3(1), 63-70. http://dx.doi.org/10.1109/17.6006

Muthuveloo, R., Ping, T.A. and Meng, L.S., 2015. The impact of organizational stakeholders' care on organizational commitment: evidence from Malaysia. Problems and perspectives in management, (13, Iss. 2 (spec. iss.)), pp.258-268.

Myers SC. 1977. Determinants of corporate borrowing. *Journal of Financial Economics* 5: 147- 175.

Naini, A.R.J. and Naderian, M.A., 2019. Oil price cycles, fiscal dominance and countercyclical monetary policy in Iran. OPEC Energy Review, 43(1), pp.3-28.

Nair, A., Rustambekov, E., McShane, M. and Fainshmidt, S., 2014. Enterprise risk management as a dynamic capability: A test of its effectiveness during a crisis. Managerial and Decision Economics, 35(8), pp.555-566.

Nastasi, B.K., Hitchcock, J.H. and Brown, L.M., 2010. An inclusive framework for conceptualizing mixed methods design typologies: Moving toward fully integrated synergistic research models. Handbook of mixed methods in social & behavioral research, 2, pp.305-338.

Neuman, W.L., 2006. Qualitative and quantitative research designs. Social research methods: Qualitative and quantitative approaches, 6, pp.149-178.

Nickmanesh, S., Zohoori, M., Musram, H.A.M., & Akbari, A., 2013. Enterprise risk management and performance in Malaysia. *Interdisciplinary Journal of Contemporary Research in Business*, 5(1), 670-707.

Nistor, C., 2005. Economic Relations International Risk Management. *Didactic and Pedagogic RA, Bucharest*.

Nocco, B.W. and Stulz, R.M., 2006. Enterprise risk management: Theory and practice. *Journal of applied corporate finance*, 18(4), pp.8-20.

NPC, 2005. Norwegian Petroleum Consultants Annual Report. [Online] Espoo. Available at: http://file:///C:/Users/HP/Downloads/Dovre2015_EN_web%20(1).pdf.

NYSE, 2014. NYSE: Corporate Governance Guide. 1st ed. [ebook] London: Tim Dempsey. Available at: https://www.nyse.com/publicdocs/nyse/listing/NYSE_Corporate_Governance_Guide.pdf.

O'Donnell, E., 2005. Enterprise risk management: A systems-thinking framework for the event identification phase. *International Journal of Accounting Information Systems*, 6(3), pp.177-195.

OECD, 2009. Annual Report, 2009. [Online] OECD Publishing. Available at: https://www.oecd.org/newsroom/43125523.pdf.

OECD, 2011. "Joint Report by IEA, OPEC, OECD and World Bank on Fossil-Fuel and Other Energy Subsidies: An Update of the G20 Pittsburgh and Toronto Commitments". Publishing. Available at:
https://www.oecd.org/env/49090716.pdf

Ogutu, J., Bennett, M.R. and Olawoyin, R., 2018. Closing the gap: between traditional and enterprise risk management systems. Professional Safety, 63(04), pp.42-47.

Ojeka, S.A., Adegboye, A., Adegboye, K., Alabi, O., Afolabi, M. and Iyoha, F., 2019. Chief financial officer roles and enterprise risk management: an empirical based study. Heliyon, 5(6), p.e01934.

Olayungbo, D.O., 2019. Effects of Global Oil Price on Exchange Rate, Trade Balance, and Reserves in Nigeria: A Frequency Domain Causality Approach. *Journal of Risk and Financial Management*, 12(1), p.43.

OPEC, 2001. OPEC Annual Report. [Online] Vienna: Ueberreuter Print and Digimedia. Available at: https://www.opec.org/opec_web/static_files_project/media/downloads/publications/AR002001.pdf.

OPEC, 2019. OPEC Monthly Oil Market Report. [Online] Vienna: OPEC. Available at: https://www.opec.org/opec_web/static_files_project/media/downloads/publications/MOMR%20September%202019.pdf.

Bank of International Settlements., 2001. Operational Risk. Available online: http://www.webcitation.org/6tjuXt27o.

Osborne, J.W., 2015. Best practices in logistic regression. Sage Publications.

Paape, L. and Speklè, R.F., 2012. The adoption and design of enterprise risk management practices: An empirical study. European Accounting Review, 21(3), pp.533-564.

Pagach, D. and Warr, R., 2007. An empirical investigation of the characteristics of firms adopting enterprise risk management. North Carolina State University working paper.

Pagach, D. and Warr, R., 2008. The Effects of Enterprise Risk Management on Firm Performance Jenkins Graduate School of Management North Carolina State University Raleigh.

Pagach, D. and Warr, R., 2011. The characteristics of firms that hire chief risk officers. *Journal of risk and insurance*, 78(1), pp.185-211.

Pagach, D.P. and Warr, R.S., 2010. The effects of enterprise risk management on firm performance. Available at SSRN 1155218.

Pagura, I., 2016. Work health and safety: Risk management. *Journal of the Australian Traditional-Medicine Society*, 22(3), p.164.

Panicker, S., 2016, an Empirical Analysis of ERMI (Enterprise Risk Management Index) on Organisational Turnarounds and Its Impact on Information Technology Sector.

Payle, J.F., 1995. Humanism and positivism in nursing. *Journal of Advanced Nursing*, 22(5), pp.979-984.

Peck, L., 2016. An Examination on American Insurance Group, Inc., Citigoup, Inc., and Lehman Brother Holdings, Inc. During the Recession of 2008.

Peirce, C.S., 1992. The essential Peirce: selected philosophical writings (Vol. 2). Indiana University Press.

Perrin, T.-T., 2001. Creating Value through Enterprise Risk Management - a Practical Approach for the Insurance Industry. From: http://www.towersperrin.com/tp/getwebcachedoc?webc¼till/usa/2001/200106/20020 51306.pdf.

Perrin, T.T., Miccolis, J. and Shah, S., 2000. Enterprise Risk Management: An Analytic Approach. Tillinghast-Towers Perrin Monograph.

Peter, J.P., 1979. Reliability: A review of psychometric basics and recent marketing practices. *Journal of marketing research*, 16(1), pp.6-17.

Petersen, M.A. and Thiagarajan, S.R., 2000. Risk measurement and hedging: With and without derivatives. Financial Management, pp.5-29.

Peterson, R.A., 1994. A meta-analysis of Cronbach's coefficient alpha. *Journal of consumer research,* 21(2), pp.381-391.

Petersson, P. and McCabe, A., 2017. The Benefit of Risk Reduction: A quantitative study on the effect of Enterprise Risk Management in the Nordic Market.

Petrucci, C.J., 2009. A primer for social worker researchers on how to conduct a multinomial logistic regression. *Journal of social service research*, 35(2), pp.193-205.

Phan, T., Dang, T., Nguyen, T., Ngo, T. and Hoang, T., 2020. The effect of enterprise risk management on firm value: Evidence from Vietnam industry listed enterprises. Accounting, 6(4), pp.473-480.

Pieket Weeserik, B. and Spruit, M., 2018. Improving Operational Risk Management Using Business Performance Management Technologies. Sustainability, 10(3), p.640.

Pierce, E.M., Goldstein, J. and Pierce, E., 2016, October. Moving from enterprise risk management to strategic risk management: examining the revised COSO ERM framework. In 14th Global Conference on Business and Economics, (October).

Ping, T.A. and Muthuveloo, R., 2015. The impact of enterprise risk management on firm performance: Evidence from Malaysia. Asian Social Science, 11(22), p.149.

Pituch, K.A. and Stevens, J.P., 2015. Applied multivariate statistics for the social sciences: Analyses with SAS and IBM's SPSS. Routledge.

Plankey-Videla, N., 2012. Informed consent as process: Problematizing informed consent in organizational ethnographies. Qualitative Sociology, 35(1), pp.1-21.

Plessis, J., Schanfield, A. and Menevse, A., 2015. JAA Inc.—a case study in creating value from uncertainty, in Fraser, J.R., Simkins, B. J. and Narvaez, K. (Eds.), Implementing Risk Management: Case Studies and Best Practices, John Wiley & Sons, Inc., Hoboken, New Jersey, pp. 427-459.

Pooser David, M. and Tobin Peter, J., 2012, August. ERM Determinants, Use, and Effects on the Firm. In American Risk and Insurance Association Annual Meeting, Minneapolis, MN.

Pooser, D.M. and McCullough, K.A., 2012. ERM Determinants, Use, and Effects on the Firm. American Risk and Insurance Association, Minneapolis, Minnesota.

Power, M., 2004. The risk management of everything: Rethinking the politics of uncertainty. Demos.

Power, M., 2005, ―The invention of operational risk,‖ Review of International Political Economy, 4, 12, 577–599

Power, M., 2009. The risk management of nothing. Accounting, organizations and society, 34(6-7), pp.849-855.

PricewaterhouseCoopers LLP (PwC), 2004. Managing risk: An assessment of CEO perspectives. PwC, New York.

Protiviti, 2018. Executive Perspectives on Top Risks for 2018: Key Issues Being Discussed In the Board Room and C-Suite. US: Protiviti. Available at: http://www.protiviti.com/sites/default/files/united_states/insights/2018-top-risks-survey-energy-utilities-industry-group-protiviti.pdf.

Prunea, P., 2003. The risk in economic activity. *Hypostases, factors and ways of reduction*.

Purdy, G., 2010. ISO 31000: 2009—setting a new standard for risk management. *Risk Analysis: An International Journal*, *30*(6), pp.881-886.

Putlitz, U., 2019. Insurance obligations in the execution of projects. Civil Engineering= Siviele Ingenieurswese, 27(v27i7), pp.46-51.

PWC, 2008a. Does ERM matter? Enterprise risk management in the insurance industry: A global study [online]. PriceWaterHouseCoopers. Available from: https://www.pwc.com/gx/en/insurance/pdf/erm_highlights.pdf.

PWC, 2008b. Enterprise Risk Management (ERM) Benchmarking Survey 2008 [online]. PricewaterhouseCoopers. Available from: https://www.pwc.fi/fi/julkaisut/tiedostot/erm_benchmarking_survey_2008.pdf.

PWC, 2016. Risk Committee _ Guidance Not On Corporate Governance. [Online] Hong Kong: Pricewaterhousecooper, p.1. Available at: https://www.pwccn.com/en/migration/pdf/in-risk-committee-nov2016.pdf

Quon, T.K., Zeghal, D. and Maingot, M., 2012. Enterprise risk management and firm performance. Procedia-Social and Behavioral Sciences, 62, pp.263-267.

Rao, A. and Marie, A., 2007. Current Practices of Enterprise Risk Management in Dubai. Management accounting quarterly, 8(3).

Raz, T. and Hillson, D., 2005. A comparative review of risk management standards. Risk Management, 7(4), pp.53-66.

Razali, A.R. and Tahir, I.M., 2011. Review of the literature on enterprise risk management. Business management dynamics, 1(5), p.8.

Razali, A.R. and Tahir, I.M., 2011. The determinants of enterprise risk management (ERM) practices in Malaysian public listed companies. *Journal of Social and Development Sciences*, 1(5), pp.202-207.

Reed, M. (2005) 'Reflections on the 'Realist Turn' in Organization and Management Studies', *Journal of Management Studies* 42(8): 1621–44

Reigle, R.F., 2003. Organizational Culture Assessment: Development of a Descriptive Test Instrument: A Dissertation (Doctoral dissertation, University of Alabama in Huntsville).

Renzi, A. and Vagnani, G., 2020. Corporate Governance, Enterprise Risk Management, and Inter-temporal Risk Transfer. Journal of Modern Accounting and Auditing, 16(3), pp.105-116.

RIMS, 2011. FAQ on SRM and ERM. Why Strategic Management?. Retrieved April 20, from: http://www.rims.org/resources/ERM/Documents/.

Ritchie, J., Lewis, J. and Elam, G., 2003. Designing and selecting samples (pp. 77-108). London: Sage.

Rochette, M., 2009. From risk management to ERM. *Journal of Risk Management in Financial Institutions*, 2(4), pp.394-408.

Rodriguez, E. and Edwards, J.S., 2009, April. Knowledge management and enterprise risk management implementation in financial services. In Proceedings of 2009 Enterprise Risk Management Symposium, Chicago, IL.

Rodriguez, E. and Edwards, J.S., 2009. Applying knowledge management to enterprise risk management: Is there any value in using KM for ERM?. *Journal of Risk Management in Financial Institutions*, 2(4), pp.427-437.

Rogers, V.C. and Ethridge, J.R., 2016. Enterprise Risk Management in the Oil and Gas Industry: An Analysis of Selected Fortune 500 Oil and Gas Companies' Reaction in 2009 and 2010. *American Journal of Business Education*, 9(1), pp.23-30.

Rosa, E., (1998). Meta theoretical foundations for post-normal risk. *Journal of Risk Research*, 1,15–44.

Rubino, M., 2018. A comparison of the main ERM frameworks: how limitations and weaknesses can be overcome implementing IT governance. *International Journal of Business and Management,* 13(12), pp.203-214.

Ryu, C.Y., 2008. Enterprise risk management and firm value (Doctoral dissertation, uniwien).

S&P, 2008. Standard & Poor's to Apply Enterprise Risk Analysis to Corporate Ratings. Retrieved May 7, from: http://www.nyu.edu/intercep/ERM%20for%20Non-Financial%20Companies%205.7.08.pdf.

S&P, 2019. Enterprise Risk Management Evaluation Framework. 1st ed. Canada: S&P. Available at: https://www.spglobal.com/ratings/en/research/articles/190722-enterprise-risk-management-evaluation-framework-11070561.

Sabato, G., 2010. Financial crisis: where did risk management fail?. International Review of Applied Financial Issues and Economics, (2), pp.315-327.

Sadgrove, K., 2016. The complete guide to business risk management. Routledge.

Saeidi, P., Saeidi, S.P., Sofian, S., Saeidi, S.P., Nilashi, M. and Mardani, A., 2019. The impact of enterprise risk management on competitive advantage by moderating role of information technology. Computer Standards & Interfaces, 63, pp.67-82.

Saint-Germain, M.A., 2001. Data collection strategies II: Qualitative research.

Salazar, N.B., 2010. 15 From Local to Global (and Back): Towards Glocal Ethnographies of Cultural Tourism. Cultural tourism research methods, p.188.

Sarbanes, P., 2002, July. Sarbanes-Oxley act of 2002. In The Public Company Accounting Reform and Investor Protection Act. Washington DC: US Congress.

Saunders, M., Lewis, P. and Thornhill, A., 2012. Research Methods for Business Students (6th edn.). Harlow: Pearson Education.

Saunders, M., Lewis, P. and Thornhill, A., 2016. Research Methods for Business Students (7th edn.). Harlow: Pearson Education.

Saunders, M., Lewis, P. and Thornhill, A., 2018. Research Methods for Business Students (8th edn.) Harlow: Pearson Education.

Sayer, A., 2000. Realism and Social Science. London: Sage Publications

Sayilir, Ö. and Farhan, M., 2017. Enterprise Risk Management and Its Effect on Firm Value in Turkey. *Journal of Management Research*, *9*(1), pp.86-99.

Schrand, C., Unal, H., 1998. Hedging and coordinated risk management: evidence from thrift conversions. *The Journal of Finance* 53 (3), 979e1013.

Schroeder, B. and Jackson, J., 2007. Why Traditional Risk Management Fails In The Oil And Gas Sector: Empirical Front-Line Evidence And Effective Solutions. 1st ed. Available at: http://www.ap-networks.com/wp-content/uploads/2016/11/6-why-traditional-risk-management-fails-in-the-oil-and-gas-sector.pdf.

Scotland, J., 2012. Exploring the philosophical underpinnings of research: Relating ontology and epistemology to the methodology and methods of the scientific, interpretive, and critical research paradigms. English language teaching, 5(9), pp.9-16.

Secretariat of ISO TMB WG on Risk Management, 2007. Committee Draft of ISO 31000'Risk Management—Guidelines on Principles and Implementation of Risk Management.

Sekerci, N. and Pagach, D.P., 2019. Enterprise Risk Management and Corporate Governance. Available at SSRN 3366489.

Sekerci, N., 2013. Does Enterprise Risk Management create value for firms?: Evidence from Nordic countries. In 7th Nordic Econometric Meeting 2013 in Bergen (pp. 1-43).

Sekerci, N., 2015. Does enterprise risk management create value for firms?. In The Routledge Companion to Strategic Risk Management (pp. 409-440). Routledge.

Selim, G. and McNamee, D., 1999. Risk management and internal auditing: what are the essential building blocks for a successful paradigm change?. *International Journal of Auditing*, 3(2), pp.147-155.

Shapiro, S.S. and Wilk, M.B., 1965. An Analysis of Variance Test for Normality (Complete Samples). Biometrika, Vol. 52, No. 3/4, pp. 591-611.

Shenkir, W.G. and Walker, P.L., 2006. Enterprise risk management: Frameworks, elements, and integration. Institute of Management Accountant.

Silva, J.R., Silva, A.F.D. and Chan, B.L., 2019. Enterprise risk management and firm value: evidence from Brazil. Emerging Markets Finance and Trade, 55(3), pp.687-703.

Silvestri, A., Arena, M., Cagno, E., Trucco, P. and Azzone, G., 2011. Enterprise risk management from theory to practice: The role of dynamic capabilities Approach–the "Spring" model. In Quantitative Financial Risk Management (pp. 281-307). Springer, Berlin, Heidelberg.

Simkins, B. and Ramirez, S.A., 2007. Enterprise-wide risk management and corporate governance. Loy. U. Chi. LJ, 39, p.571.

Simona-Iulia, C., 2014. Comparative study between traditional and enterprise risk management-a theoretical approach. Annals of the University of Oradea, 23(1), pp.276-282.

Singh, K., 2007. Quantitative social research methods. Sage.

Sithipolvanichgul, J., 2016. Enterprise risk management and firm performance: developing risk management measurement in accounting practice.

Smith, C.W. and Stulz, R.M., 1985. The determinants of firms' hedging policies. *Journal of financial and quantitative analysis,* 20(4), pp.391-405.

Smith, T.J. and McKenna, C.M., 2013. A comparison of logistic regression pseudo R2 indices. Multiple Linear Regression Viewpoints, 39(2), pp.17-26.

Sobel, P.J. and Reding, K.F., 2004. Aligning corporate governance with enterprise risk management. Management Accounting Quarterly, 5(2), p.29.

Soliman, A. and Mukhtar, A., 2017. Enterprise Risk Management and firm performance: an integrated model for the banking sector. Banks and Bank Systems.

Standard & Poor's (S&P), 2005, Criteria, Insurance, General: Evaluating the Enterprise Risk Management Practices of Insurance Companies. Available at: www.standardandpoors.com.

Standard & Poor's (S&P), 2007, Enterprise Risk Management Assessments on Europe's Insurers.

Standard & Poor's (S&P), 2009, Criteria, Insurance, General: Expanded Definition of Adequate Classification in Enterprise Risk Management Scores. Available at: www.standardandpoors.com.

Standard & Poor's (S&P), 2013a, Criteria, Insurance, General: Enterprise Risk Management. Available at: www.standardandpoors.com.

Standard & Poor's (S&P), 2013b, Will European Insurers' ERM Developments Continue without a Solvency II Push?. Available at: www.standardandpoors.com/ratingsdirect.

Standard & Poor's, 2005. Global stock markets factbook.

Stroh, P.J., 2005. Enterprise risk management at UnitedHealth Group. Strategic Finance, pp.26-35.

Stulz, R.M., 1996. Rethinking risk management. *Journal of applied corporate finance*, 9(3), pp.8-25.

Subramaniam, N., Carey, P., de Zwaan, L. and Stewart, J., 2011. Internal audit involvement in enterprise risk management. *Managerial auditing journal.*

Suddaby, R., 2006. From the editors: What grounded theory is not.

Tahir, I.M. and Razali, A.R., 2011. The Relationship between enterprise risk management (ERM) and firm value: Evidence from Malaysian public listed companies. *International journal of economics and management sciences*, 1(2), pp.32-41.

Taran, Y., Boer, H. and Lindgren, P., 2013. Incorporating enterprise risk management in the business model innovation process. *Journal of Business Models*, 1(1).

Tashakkori, A. and Creswell, J.W., 2007. Exploring the nature of research questions in mixed methods research.

Tashakkori, A. and Teddlie, C., 2003. Handbook on mixed methods in the behavioral and social sciences.

Tashakkori, A. and Teddlie, C., 2003. The past and future of mixed methods research: From data triangulation to mixed model designs. Handbook of mixed methods in social and behavioral research, pp.671-701.

Tavakol, M. and Dennick, R., 2011. Making sense of Cronbach's alpha. *International journal of medical education*, 2, p.53.

Taylor, S.S., Fisher, D. and Dufresne, R.L., 2002. The aesthetics of management storytelling: A key to organizational learning. Management Learning, 33(3), pp.313-330.

Teddlie, C. and Tashakkori, A., 2009. Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences. Sage.

The Philadelphia Contributionship, 2018. The Philadelphia Contributionship. [Online] US. Available at: https://issuu.com/thephiladelphiacontributionship/docs/2018_final_annual_report.

Thiessen, K., R. E. Hoyt, and B. M. Merkley, 2001, a Composite Sketch of a Chief Risk Officer, (Canada: The Conference Board of Canada).

Tolleson, T.D. and Pai, K., 2011. The big 4 accounting firms: too big to fail. *International Journal of Business, Accounting, and Finance*, 5(1), pp.56-66.

Toma, S.V., Chiriţă, M. and Şarpe, D., 2012. Risk and uncertainty. Procedia Economics and Finance, 3, pp.975-980.

Toneguzzo, J.P., 2011. How to allocate resources based on risk. In Enterprise Risk Management.

Toronto Stock Exchange and Institute of Corporate Directors, 1999, Report on Corporate Governance, 1999: Five Years to the Dey (Toronto Stock Exchange).

Tosi Jr, H.L. and Gomez-Mejia, L.R., 1989. The decoupling of CEO pay and performance: An agency theory perspective. Administrative Science Quarterly, pp.169-189.

Treece, E.W. and Treece Jr, J.W., 1977. Elements of research in nursing. Nursing2019, 7(6), pp.12-13.

Trochim, W.M., 2000. Research methods knowledge base-survey research. Am J Sports Med, 30(6), p.212.

Trochim, W.M., Donnelly, J.P. and Arora, K., 2016. The essential research methods knowledge base. Boston, MA: Cengage.

Trochim, W.M.K. and Donnelly, J.P., 2006. Research Methodology Knowledge Base. Retrieved August, 23, p.2006.

TSX, 2020. Statement of Corporate Governance Practice. Toronto: TSX. Available at: https://www.tmx.com/resource/en/451/statement-of-corporate-governance-practices-2020-04-06-en.pdf.

Tufano, P., 1996. Who manages risk? An empirical examination of risk management practices in the gold mining industry. *The Journal of Finance*, 51(4), pp.1097-1137.

Tufano, P., 2011. Managing risk in higher education. In Forum Futures 2011 (pp. 54-58). EDUCAUSE.

Turnbull, N., 1999. Internal control: Guidance for directors on the combined code. Institute of Chartered Accountants in England & Wales.

UN, 2019. World Economic Situation and Prospects. [Online] New York, p.26. Available at: https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/WESP2019_BOOK-web.pdf.

Unit, E.I., & MMC Enterprise Risk., 2001. Enterprise risk management: Implementing new solutions.

Unit, E.I., 2005. The evolving role of the CRO. The Economist Intelligence Unit, London/New York/Hong Kong (May).

Uwadiae, O., 2015. COSO–An Approach to Internal Control Framework. Delloite, viewed, 14(09).

Uwizeye, P, 2013. Enterprise-Wide Risk Management (EWRM): Identification, Analysis and Management of Implementation Barriers within an African Telecommunications Enterprise (doctoral dissertation), Heriot–Watt University.

Vagneur, K., 2004. Corporate Governance. Text Book. Edinburgh Business School. Release CG-A2-engb 1/2007 (1032), EBS

Vale, L., Silcock, J. and Rawles, J., 1997. An economic evaluation of thrombolysis in a remote rural community. BMJ, 314(7080), p.570.

Van Belle, G., 2011. Statistical rules of thumb (Vol. 699). John Wiley & Sons.

Van Maanen, J., Sørensen, J.B. and Mitchell, T.R., 2007. The interplay between theory and method. Academy of management review, 32(4), pp.1145-1154.

Vu, D.H., Muttaqi, K.M. and Agalgaonkar, A.P., 2015. A variance inflation factor and backward elimination based robust regression model for forecasting monthly electricity demand using climatic variables. Applied Energy, 140, pp.385-394.

Vygotsky, L.S., 1978. Socio-cultural theory. Mind in society.

Walas-Trębacz, J., 2016, Instruments Used in Designing Systems of Risk Management in an Enterprise1. And Competitiveness of Modern Business, p.119.

Walker, P., 2015. Enterprise Risk Management in the Energy Industry. [Online] New York: St. John's University. Available at: https://static1.squarespace.com/static/57ea5fde440243231bc154b7/t/5819e4aaff7c502 184796f7a/1478091947059/ERM+in+the+Energy+Industry+2016.pdf.

Walker, P.L., Shenkir, W.G., Barton, T.L., 2002. Enterprise Risk Management: Putting it all together. Institute of Internal Auditors Research Foundation, Altamonte Springs, FL

Walker, R., 2015. The increasing importance of operational risk in enterprise risk management. Enterprise Risk Management, 82.

Wessells, S.J. & Sadler, E. (2015). Risk Management in Higher Education: An Open Distance Learning Perspective. South African Business Review, 75-98.

Westerfield, J.M., 1977. An examination of foreign exchange risk under fixed and floating rate regimes. *Journal of International Economics*, 7(2), pp.181-200.

Wigblad, R., 2003, November. Praktikteori–en möjlig interaktiv forskningsstrategi. SIRA-conference "Interaktiv forskning–utmaningar för akademin", Växjö.

Wilkinson, C., 2010. Insurance handbook. Insurance information inistute, New York.

Williams, C., 2007. Research methods. *Journal of Business & Economics Research (JBER),* 5(3).

Wu, D., Olson, D.L. and Dolgui, A., 2015. Decision making in enterprise risk management: A review and introduction to special issue.

Wu, D.D., Olson, D.L. and Birge, J.R., 2011. Introduction to special issue on" Enterprise risk management in operations". *International Journal of Production Economics*, 134(1), pp.1-2.

Wu, Y., Marshall, A., Chipulu, M., Li, Q. and Ojiako, U., 2014. Enterprise risk management and firm value within China's insurance industry. Professional Accountant, 14(1), pp.1-10.

Wyman, M.O., 2005. More Companies Using Enterprise Risk Management to Handle Risk. In *The Conference Board/MOW.*

Yatim, P., 2009. Audit committee characteristics and risk management of Malaysian listed firms. Management & Accounting Review (MAR), 8(1), pp.19-36.

Yazid, A.S., Hussin, M.R. and Daud, W.N.W., 2011. An examination of enterprise risk management (ERM) practices among the government-linked companies (GLCs) in Malaysia. International Business Research, 4(4), p.94.

Zingales, L., 2008. Causes and effects of the Lehman Brothers bankruptcy. Committee on Oversight and Government Reform US House of Representatives, pp.23-25.

Zou, H., 2010. Hedging affecting firm value via financing and investment: evidence from property insurance use. Financial Management, 39(3), pp.965-99

Appendix A: ERM Survey

Enterprise Risk Management Survey

1. The Effect of Enterprise Risk Management on Firm Value

I am conducting a survey about the effect of Enterprise Risk Management (ERM) on firm value in the energy and natural resources firms listed in New York Stock Exchange (NYSE). The main objective of this survey is to examine the ERM deployment stage in the sector and to identify the main factors that influence its implementation. Please take a few minutes to answer the following questionnaire. Note that this survey is primarily intended for Chief Risk Officers, CEOs, CFOs and Risk Managers, but others responses are also appreciated. It is very important that you answer all questions, as incomplete surveys may not be usable. This survey is a part of my DBA thesis at University of Wales Trinity Saint David in UK.

Please note that the following definition of ERM is used in this study (COSO, 2003):

"Enterprise risk management is a process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risks to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives".

No individual or company will be publicly identified and all the responses are treated confidentially in line with the University of Wales Trinity Saint David Ethical Standards.

Thank you for taking the time to complete this survey.

Please do not hesitate to contact me if you have any question.

Regards
Ali Kinyar MBA
DBA Candidate at University of Wales Trinity Saint David
Ali.k@ermresearch.co.uk

Enterprise Risk Management Survey

2. ERM Survey Questions

Part 1: Respondent Background

1. Name of your company

2. Age

◯ Under 30

◯ Between 30 and 40

◯ Between 40 and 50

◯ Over 50

3. Highest level of education held

◯ Bachelors degree

◯ Masters Degree or higher

4. How long have you worked at the company?

◯ Less than 4 years   ◯ 12 to 16 years

◯ 4 to 8 years   ◯ more than 16 years

◯ 8 to 12 years

5. Indicate the annual revenues of your company in US dollars

◯ $500,000,000 or below   ◯ Greater than $1000,000,000 but less than $5000,000,000

◯ Greater $500,000,000 but less than $1000,000,000   ◯ Greater than $5000,000,000

6. Indicate your company's primary industry

○ Oil and gas   ○ Chemicals

○ Electrical Energy   ○ Water supply

○ Mining   ○ power and utilities

○ Other (please specify)

[   ]

7. what is your position in the company

○ Chief Executive Officer

○ Chief Financial Officer

○ Chief Risk Officer

○ Manager

○ Other (please specify)   [   ]

Part 2: ERM Index

8. Please indicate your organization's current stage of ERM development (check one):

○ ERM program is well formulated and Implemented across the whole firm   ○ ERM programme is not in place, however the company is considering implementing one

○ Partial ERM framework in place (i.e., some, but not all, risk areas addressed)   ○ No ERM framework in place and no plans to implement one

○ The ERM implementation strategy is already developed however the company didn't start its implementation

9. Years since establishment of ERM in the organization

○ Less than 1 year   ○ 7-9 years

○ 1-3 years   ○ More than 9 years

○ 4-6 years

10. The main reason when no ERM framework in place (If you have an ERM in place go to Q12)

○ It is not high on the agenda of the Board of Directors, Audit Committee and Management Committee

○ There are no resources available (people, budget)

○ We can not see any benefits in implementing an ERM program

○ Other (please specify)

[   ]

11. Are you planning to implement an ERM programme, or any ERM practices in future

○ We are considering implementing ERM

○ We have decided not to proceed at this time

○ We do not have any plan to implement an ERM programme

12. Is there a management level risk committee?

○ Yes

○ No

Part 3: ERM Determinants

13. Is there a Senior Executive or CRO overseeing enterprise risk management

○ Yes

○ No

14. To what extent the implementation of ERM in your firm is affected by your Big four Audit firm activities?

Not at all	To a small extent	To a moderate extent	To a large extent	To a very large extent
○	○	○	○	○

15. To whom does the Chief Risk Officer report? (If any)

○ Chief Executive Officer   ○ Board Director

○ Chief Financial Officer   ○ Audit committee

○ Other (please specify)

[   ]

16. What are the primary drivers of your ERM programme

○ Board of Directors

○ Regulators

○ Risk events (Internal and External)

○ Other (please specify)

[   ]

Appendix B: Ethical Approval from the University of Wales Trinity Saint David

Dear Ali

Ref: EC366

Re: Request for Ethical Approval

I am pleased to confirm that the submission of the Ethical Approval on your research 'The Effect of the adoption of Enterprise risk management on firm value: Evidence from North American energy and natural resources industry' has been APPROVED by the University's Ethics Committee. You may now continue with your research.

Please ensure that you are aware of, and use, the University's Research Data Management Policy and the extensive resources on the University's Research Data Management web pages (http://uwtsd.ac.uk/library/research-data-management/).

Please do not hesitate to contact the office should you require any further information on this matter.

Elizabeth Cook
Swyddog Gweinyddol a Gwasanaethau'r Gofrestrfa / Administrative and Registry Services Officer
Swyddfa Academaidd (*Ymchwil Ôl-raddedig*) / Academic Office *(Postgraduate Research)*

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Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

Appendix C: Pilot Study Result

Table 3. 3 Pilot Study Result

Industry group	Department	Country	No of participants	Position	Feedback
Oil and Gas	Auditing/Accounting	UK	2	Risk Manager	Redefine Question 15 and add the audit committee to the list of choices.
Oil Refining	Project Management	UK	1	Managing Director	Rephrase, question 14. Explain what the Big 4 Audit Firms are.
Coal Mining	Risk Management and Insurance	USA	1	Head of Risk Management	To use CRO as a control variable in the study, question 13 should be asking for CRO only. Delete Senior Executives from the question and keep CRO only.
Mining and Minerals	Finance	Canada	2	Commodities Risk Manager	What if the CRO report for someone or department other than those you included in question 15. Add 'others' tab.
Power and Electricity	Senior Management	USA	1	CEO	Ensure to ask about ERM only in question 13.
Power and Electricity	Environment Compliance	UK	2	Risk Management Committee	Ensure survey completion time does not exceed 10 min
Water Supply	Senior Management	UK	1	CFO	