Chair of Economic- and Business Management

Doctoral Thesis

An Examination of the Effectiveness of Executive Compensation and ManagementActivities on the Performance of selected Oil and Gas Exploration and Production Companies listed on New York and Toronto Stock Exchanges

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AFFIDAVIT

I declare on oath that I wrote this thesis independently, did not use other than the specified sources and aids, and did not otherwise use any unauthorized aids.

I declare that I have read, understood, and complied with the guidelines of the senate of the Montanuniversität Leoben for "Good Scientific Practice".

Furthermore, I declare that the electronic and printed version of the submitted thesis are identical, both, formally and with regard to content.

Date 08.02.2022

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Abstract

In the wake of frequently excessive pay packages that are rewarded to executives despite a weak company performance, the pay-for-performance issue has received widespread attention during the last 30 years.

The boards of listed companies and their compensation committees are under increasing scrutiny by shareholders, stakeholders, proxy firms, the media, and the public regarding compensation contracts for their executives.

This thesis examined whether there is a link between the effectiveness of executive compensation and management activities on the performance of oil and gas exploration and production companies. For this purpose, a sample of 85 such companies listed on the New York and Toronto stock exchanges was analyzed as the executive compensation disclosure regulations on these exchanges are the same.

The statistical analyses showed that short-term and long-term components in compensation contracts—as agreed upon between boards and executives—and management activities only have a small effect on the absolute 3-years total shareholder return as a market-based indicator.

As to accounting-based indicators, there is a weak association between compensation components and revenue growth but a strong link between management activities and revenue growth.

In terms of management activities, the greatest impact on revenue growth comes from the oil and gas output growth, which in turn is influenced mainly by heavy capital expenditures.

There is no link between compensation components, management activities, and net income growth as another accounting-based indicator.

Based on these findings recommendations were made for boards and compensation committees concerning the design of targets in compensation agreements for companies in the investigated industry sector.

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List of Abbreviations

AIP	Annual Incentive Plan
boe	Barrel oil equivalent
CAD	Canadian Dollar
CAPEX	Capital expenditures
CEO	Chief executive officer
CFO	Chief financial officer
DEF 14A	Definitive proxy statement
EBITDA	Earnings before Interest, Taxes, Depreciation, and Amortization
E&P	Exploration & Production
ESG	Environment, Social, Governance
ETF	Exchange Traded Fund
EU	European Union
EVA	Economic Value Added
GAAP	Generally Accepted Accounting Principles
GDP	Gross Domestic Product
IFRS	International Financial Reporting Standards
ISS	Institutional Shareholder Services
KPI	Key Performance Indicator
LTI(P)	Long-term Incentive (Plan)
MIC	Management Information Circular
NASDAQ	National Association of Securities Dealers Automated Quotation
NEIP	Non-Equity Investment Plan
NPV	Net Present Value

NYSE	New York Stock Exchange
OCF	Operating Cash Flow
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Squares
PP&E	Plant, Property, and Equipment
PIMS	Profit Impact of Market Strategy
ROA	Return on Assets
ROACE	Return on Average Capital Employed
ROCE	Return on Capital Employed
ROI	Return on Investment
SEC	Securities and Exchange Commission
SAR	Stock Appreciation Right
SCT	Summary Compensation Table
SOX	Sarbanes-Oxley Act
S&P	Standard & Poor´s
STI(P)	Short-term Investment (Plan)
TSR	Total Shareholder Return
TSX	Toronto Stock Exchange
TSXV	TSX Venture Exchange
US	United States of America
USD	United States Dollar
WTI	West Texas Intermediate

1 Introduction

1.1 Problem Statement and Research Gap

Executive pay has become an increasingly important issue in all western jurisdictions as well as in management theory and academic research during the last three decades. It is a consequence of more refined corporate governance rules and a matter of concern for many stakeholders, including boards, executives, shareholders, proxy firms, and regulators (Bizjak et al., 2015, pp. 1–2). The topic has received increasing attention in recent years and among the wider public because executives were paid high salaries and bonuses even when companies underperformed or management did not reach set targets, which has not only triggered public discussion but also an increasing intensity of shareholder activism and several “shareholder pay revolts” against bonus payments (O’Regan, 2016, pp. 131–132; Henry, 2018, p. 325).

Executive compensation plans in listed companies—which are the main result of board remuneration policies—are structured by remuneration committees and put forward to shareholders at the annual general meeting (AGM) by the board of directors together with the actual total compensation granted to the members of the executive board. On the New York Stock Exchange, remuneration committees must entirely consist of independent directors (Segal et al., 2017, p. 3), whereas it is recommended on the Toronto Stock Exchange (MacDougall & Valley, 2019, p. 51).

They must ensure that remuneration arrangements support the strategic aims of the business and enable the recruitment, motivation, and retention of executives while complying with the applicable laws and regulations (Hosken et al., 2017, pp. 13–14).

The growing role of proxy firms such as ISS and Glass Lewis—providing services to shareholders to vote their shares at AGMs—has had an increasing impact on compensation plan designs and remuneration policies as they act as independent advisors to shareholders (in most cases institutional shareholders) by scrutinizing all elements of pay in detail and comparing those with the fulfillment of the targets

of the companies. Nowadays, proxy firms play a crucial role in corporate governance and executive compensation policy as an important part thereof (Rezaee & Fogarty, 2020, p. 816).

The Dodd-Frank legislation of 2010 had a major impact on listed companies in the US by requiring public companies to ask shareholders to approve the compensation package for the top executives by mandatory, non-binding “say on pay” resolutions at least every 3 years (Hosken et al., 2017, pp. 11–12). Several consulting firms such as KPMG or Mercer Kepler offer extensive compensation benchmarking for all relevant executive jobs, business sectors, and company sizes, providing boards, remuneration committees, shareholders, and proxy groups with valuable guidance as to the situation on the labor markets and the appropriateness of compensation policies and compensation levels (e.g., Mercer Compensation Index, 2020). Furthermore, independent remuneration consultants advise listed companies on designing compensation policies and compensation plans (Sheehan, 2012, pp. 69–75). They also advise companies on their chance of succeeding with such policies and plans at AGMs.

Generally, most executive compensation plans include a base salary, a short-term incentive plan (STIP), which is related to the performance of the preceding year resulting in the annual bonus, a long-term incentive plan (LTIP), which is mostly based on a 3- to 5-year period, as well as pension and health/life insurance payments. STIPs are linked to reaching short-term targets measured by key performance indicators (KPIs) that vary between industries (Reda, 2018, pp. 41–43).

In exploration and production companies (E&P companies), such KPIs are, for example, operational targets such as production volume, reserves increase, reserves replacement rate, uptime, financial targets such as profitability indicators (e.g., ROA, ROACE, ROI, NPV/boe, gross margin, net margin) or human qualitative targets, such as attrition rate of people, employee engagement, customer service, and others (Pinto et al., 2003, pp. 1–2; Babusiaux, 2007, pp. 267–269; Rouzaut & Favennec, 2011, pp. 259–263; Hey, 2017, p. 251).

- Most STIPs are paid in cash and are expressed as a percentage of the executive's base salary (Skadden, Arps, Slate, Meagher & Flom LLP, 2021, p. 57).
- The LTIPs are mainly linked to strategic performance criteria such as the TSR (total shareholder return), reserves-to-production ratio (R/P), net debt, and mergers and acquisitions (M&A) success. LTIPs are generally equity-based and granted as shares or stock options (Ellig, 2007, p. 8).

Recent developments in executive pay include claw-back provisions in case of unjustified bonus payments received in previous years and shareholding requirements for executives (at least 200% of the annual salary) to be better aligned with the interests of shareholders (Rezaee & Fogarty, 2020, pp. 483, 518–520).

Remuneration committees are in a challenging position as they are caught between the desires of executives to get a good package and the request of shareholders who will only vote for such packages in case of solid business performance. For this reason, increasing numbers of companies are seeking engagement with major shareholders and proxy firms ahead of AGMs to give them the reasoning for the executive pay, to test their preparedness for support, and to change or modify proposals in case of resistance (Larcker et al., 2015, pp. 178–179).

As a result of academic and public discussion in the last two decades on executive compensation, researchers, investors, and other stakeholders have detailed information about the terms and the structure of compensation plans (Bizjak et al., 2015, p. 29):

- Listed companies are required to prepare and publish a directors' remuneration report (DRR) as part of their annual report with clear and detailed statements as to executive remuneration and its elements and specific targets including the weighting of the targets for the STIP and LTIP.
- The complexity of compensation plans has also increased because of stricter disclosure regimes in the last decade in general, and particularly concerning the inclusion of risk factors in compensation schemes (Lam, 2017, p. 177).

The results of empirical research, however, are heterogeneous, indicating that the pay-performance relationship is either moderate and not significant or even negative. Many empirical studies have been conducted, especially in the last two decades, that try to provide evidence for the positive relationship between chief executive officer (CEO) compensation and firm performance:

- Basically, it is assumed that if—in the context of the principal-agent paradigm—agents receive payments and incentives, this will increase the chance that they engage in the desired behavior (Garen, 1994, p. 1176).
- However, when analyzing prior research results, Stone and Ziebart (1995) noted that "*relatively small changes in task conditions can produce large differences in the effects of incentives*" (p. 250). This means that the effect of incentives is not simply linear (i.e., the higher the incentive, the higher the output) as the behaviorist approach suggests in its stimulus-response model.

Deci and Ryan (1985, p. 235) stated that monetary incentives stimulate intrinsic motivation only to a certain (and mostly low) degree. Stone and Ziebart (1995) found that "*very high incentives may potentially decrease (not increase) decision quality by increasing negative affect*" (p. 259) and, thus, the performance of agents. The same effect can be observed in the opposite case, which Fehr and Schmidt (1999) call inequity inversion. *"Inequity inversion means that people resist inequitable outcomes, i.e., they are willing to give up some material payoff to move in the direction of more equitable outcomes"* (p. 819). Agents expect fair compensation. If they feel that intangible and tangible rewards adequately honor their input and skills, they are usually motivated to perform at the desired level.

As per the behavioral agency theory, the interaction between extrinsic and intrinsic motivation in the context of different and varying incentives should influence the performance of employees. According to Frey and Jegen (2001, pp. 592–595) intrinsic and extrinsic motivation interact, whereas monetary incentives can both decrease and increase intrinsic motivation. It seems to be intuitively evident that compensation and performance are not related in a simple linear relationship and that high-powered incentives are thus only a partial solution for agency problems (Bebchuk & Fried, 2004, pp. 72–73). On the contrary, recent research suggests that, for any group of agents, such as managers or top-management teams

and their firm-specific and industry-specific environment, there is a well-balanced mix of variable and fixed pay as well as other non-material factors. Boivie et al. (2011, p. 552) stated that a high identification of CEOs with their organization increases intrinsic motivation and reduces agency costs. However, it does not necessarily mean that their performance is improved.

Rappaport (1986) developed the shareholder-value approach in the 1980s. Since then, the focus on value enhancement has been one of the top issues for owners and executives of companies. Value-based incentive compensation models aim at aligning shareholder interests with those of management, overcoming the linear approach of traditional compensation schemes because it sets, for example, a bonus pool at the top of the organization that is based on the overall firm performance "*to provide the right value-creating signals to management*" (Scarlett, 2001, p. 11), and to increase the interest regarding the long-term growth of the organization (Hostettler & Stern, 2007, pp. 175–177).

Decision-making supported by pay-for-performance is rooted in the discussion on the principal-agent problem, which is the core concept of the agency theory (Mitnick, 2013, p. 9). This needs certain settings within an organization by specifying a structure of authority. Such structure defines which decisions can be taken by which members of the organization. The efficiency of this structure is based on the alignment of the decision makers' interests and the objectives of the organization (Bester & Krähmer, 2008, p. 664). Mirrlees (1976, p. 107) studied the structure of incentives and hierarchical structures and found that the optimal allocation of authority and the provision of incentives are interdependent. Therefore, the incentives should not only be aligned at the top level of owners or managers in an organization but also at all other layers of the hierarchy in the company (Bester & Krähmer, 2008, pp. 664–665). However, even if this is given, a moral hazard can occur in an organization where the owners cannot observe all management activities and only have access to a limited amount and/or imperfect quality of information. This problem is not restricted to organizations and can lead to self-serving or careless decision-making (Dutta & Radner, 1994, p. 870).

Since the establishment of the value-based concept as the basic concept for the pay-for-performance approach, scholars questioned the linkage of pay-for-performance, which is discussed in detail in Section 2.3 by examining the empirical

research since the 1990s. Although Shim and Malik (2019, pp. 25–26) point out that, since the 2008 financial crisis and the subsequent tightening of governance regulation, the link between compensation incentives and performance has positively changed, many post-2008 financial crisis studies discussed in Section 2.3 show, if at all, only weak associations between firm performance and compensation plan components.

The issue of the efficiency of the pay-for-performance concept becomes even more interesting when viewed from an industry-specific perspective. Thus, for example, in the oil and gas exploration and production industry—in which the strategic options of CEOs are limited by the industry economics and industry specifics, which do not allow a wide scope of strategic options—the one-fits-all pay-for-performance approach focusing on the TSR generates paradox effects, which the British Petroleum (BP) example illustrates.

The BP AGM disapproved the pay package of its chief executive, Bob Dudley, in 2016 as a result of "*one of the biggest AGM revolts against executive pay*" (Macalister et al., 2016). Dudley should have received a payment of GBP 14m in cash, shares, and pension contributions, as proposed by the board of directors at the AGM, although the company's stock price had underperformed in the years before and "*the company ran up its largest ever losses of $6.5bn due to a collapse in oil prices and huge fines for the Deepwater Horizon accident in 2011*" (Macalister et al., 2016).

BP's chairwoman of the remuneration committee argued that the package was somewhere in the middle of comparable companies: *"We have to reward people appropriately to attract the talented employees who are important for the future health of the company"* (Macalister et al., 2016). Starting in the 1990s, BP put a strong emphasis on cutting costs, which may have been the cause of reduced safety standards (Lustgarten, 2012, pp. 6–11).

Therefore, it can be assumed that shareholder-value pressure on profitability can lead to a negative trade-off between cost efficiency and safety standards, eventually resulting in high losses for shareholders caused by disincentives (Steffy, 2011, pp. 59, 108). Bob Dudley, appointed as CEO in 2010, has vowed to realign

company incentives to ensure "*the right balance between the short and long term*" (Dudley, cit. in Steffy, 2011, p. 259).

To summarize, many studies on the pay-for-performance issue have been published during the last 30 years. Sparked by excessive pay in many listed companies, the link between pay and performance has led to a proliferation of research articles with the topic receiving widespread attention among shareholders, stakeholders, governments, the media, and the public. Executive remuneration is a classic example of the agency problem where top managers aim for a high pay and boards—as representatives of shareholders—target a reasonable level of compensation in line with the performance of companies. This is often a balancing act that depends on many factors and requires good corporate governance with experienced directors and remuneration committees.

1.2 Research Aim

In both research areas that provide the research framework of this thesis, namely firm performance research and pay-for-performance research, the ambiguous research results are often attributed to two methodical issues: (1) the use of cross-industry samples and (2) the bias in the selection of performance indicators. Both issues are the reason for the selection of the research approach in this explorative study, which:

(1) focused on a single industry and examined only listed companies of the E&P oil and gas industry,

(2) used different performance indicators in the form of accounting-based measures (revenue growth and income growth) and a market-based measure (TSR),

(3) in contrast to the prior research discussed above, did not follow approaches such as analyzing executive pay and firm performance measured by standard indicators such as long-term/short-term compensation share ratios and others. Instead, it investigated the differences of well-performing and non-performing companies in the oil and gas exploration and production industry concerning their compensation plans and remuneration policy efficiency and the main drivers of firm performance.

The research aimed to explain the relationship between

- CEO compensation plan components and
- management activities and efficiency

on firm performance measured, as mentioned, as (1) business performance (revenue growth and net income growth) and (2) shareholding performance (in terms of TSR).

The overall aim was thus to assess whether the E&P industry's CEOs are incentivized for luck or for performance because studies focusing on E&P and comparable industries, such as the energy industry and the mining industry, provide some evidence—as will be discussed in Section 2.3—of CEOs being paid more for luck than for performance. The reason for this observation is that remuneration policies use, inter alia, performance indicators beyond the CEO's control, particularly in industries where companies are demand-driven and price takers, and thus mainly react to exogenous factors such as prices for oil and natural gas.

1.3 Research Questions and Approach

This thesis provides evidence-based answers to three research questions:

- RQ1: Can management compensation plan characteristics and remuneration policy efficiency explain E&P companies' performance?
- RQ2: Can management activities and management efficiency explain the performance of E&P companies?
- RQ3: What are the differences between performing and non-performing E&P companies concerning their management activities and management efficiency, as well as their compensation plan characteristics?

To answer these questions, this study examined a sample of 85 E&P companies listed on stock exchanges in New York (NYSE, NYSE American, NASDAQ) and in Toronto (TSX, TSXV) which have similar corporate governance codes and regulatory regimes. There is no exclusive Corporate Governance Code in the US and Canada as the rules and regulations are subject to state corporate laws, state or provincial securities legislation and stock exchange rules.

The data used are (1) compensation data such as base salary, short-term incentive plan, and long-term incentive plan, (2) financial data such as revenue growth, net income growth, return on assets (ROA), CAPEX/PP&E (capital expenditures/plant, property, equipment), (3) operational data such as proven oil and gas reserves growth and oil and gas output growth.

Based on the compensation data, the compensation plan efficiency and the remuneration policy efficiency are examined (see Table 1 for examples of both indicator groups).

Table 1 Examples of Compensation and Governance Efficiency Ratios

Compensation Plan Efficiency	Remuneration Policy Efficiency
– Long-Term Incentive Plan (LTIP)/Short-Term Incentive Plan (STIP) – Variable Pay/Fixed Pay – Base Salary/Total Cash Payments (TCP)	– Total Cash Payments (TCP)/Operating Cash Flow (OCF) – Variable Pay/Operating Cash Flow (OCF) – Fixed Pay/Operating Cash Flow (OCF)

Source: Author's presentation

To summarize, this research investigated:

- multiple research perspectives regarding compensation plan efficiency and governance efficiency as a result of the remuneration policy,
- performance measures from different firm performance perspectives,
- pay-for-performance efficiency by analyzing the data through different research lenses explaining firm performance and executive compensation efficiency.

1.4 Thesis Structure and Research Contribution

Beyond the introduction, this thesis is structured into four parts:

- the presentation of the research framework and the discussion of the related literature (Chapter 2),
- the outline of the research design (Chapter 3),
- the analysis of financial, operational, and compensation data (Chapter 4),
- the discussion of results and conclusions (Chapter 5).

In its main parts, Chapter 2 discusses two related areas of research, namely firm-performance research and management compensation research:

(1) Firm performance research examines the differences and factors explaining firm performance in terms of quantity (e.g., revenue growth and income growth) and quality (e.g., profitability and management efficiency). Different models and theories explaining firm performance are discussed in Section 2.1 and show that only the stochastic view on firm performance assumes that management activities beyond price-cost adjustment follow microeconomic laws, such as strategic management in the form of focusing on market niches (positioning), decisions for product-market strategies, competition strategies, and other concepts of strategic management can lead to an intended increase of firm performance. Accordingly, growth rates follow a random walk because firm growth is the result of the interaction of multiple factors, which generally cannot be influenced solely by the firm's management. Therefore, the success factor models with higher explanatory power cannot be developed by empirical research. All other theories assume that management activities are the main factors determining firm growth and profitability.

(2) The management compensation concepts, such as value-based management, also assume that management activities are the main factors influencing firm performance, so that specific compensation scheme designs can trigger management motivation to act in line with shareholders' interest in value growth. Compensation scheme design is regarded as the solution for the principal-agent issue and as an instrument to incentivize management and to align the interests of management and shareholders.

Section 2.3 discusses the empirical research concerning the incentive effects of compensation plan components on firm performance and concludes that ambiguous results can be found in the literature and that the intention of pay-for-performance might actually be pay for luck. This would be in line with the stochastic view, as the multitude of interacting endogenous and exogenous firm growth factors can be influenced by management activities to a limited extent only.

Porter´s seminal “diamond model” needs to be mentioned in this context as it highlights—in addition to factor conditions; demand conditions; related and supporting industries; firm strategy, structure, and rivalry—chance events as being particularly important in influencing the competitive advantage of industries. Such events are largely beyond the control of firms (and nations) and for example include major technological discontinuities, oil shocks, shifts in world financial markets or exchange rates, political decisions by foreign governments and wars (Porter, 1990, pp. 99, 156).

Chapter 3 introduces the design of this study’s empirical research, which was essentially based on financial data and, consequently, on the accounting-based model of the firm. In addition, the variables groups, the data collection and data consolidation, the data analyses, and the instruments to achieve robust models to explain firm performance effects of compensation plan components and management activities are described.

Chapter 4 provides the results of the data analyses that examine the impact of compensation components and management activities on firm performance and the differences between performing and non-performing companies regarding the TSR.

Chapter 5 presents the discussion of results, the answers to the research questions, and recommendations for the remuneration policy of company boards.

2 Research Framework

The first section of this chapter provides an overview of firm performance research whereby its main theoretical approaches are presented and analyzed. In the second part of the chapter, corporate governance and incentive design issues are discussed to explain the effects of governance and remuneration plans on firm performance. The third part reviews the empirical research on pay-for-performance in general, and in the space of the E&P industry in particular.

The empirical part of this thesis examines the effects of CEO compensation plan components and management activities on firm performance by analyzing a sample of 85 oil and gas exploration and production companies that are listed on stock exchanges in New York and Toronto. Based on an extensive literature review, a recent study found that prior investigations on the pay-for-performance nexus in a variety of industries can be grouped into three categories, namely research finding positive, negative, or non-significant effects between executive pay and firm performance (Eklund, 2019, pp. 40–42). This state of research is rather dissatisfying because the business practice relevance is low.

To deepen the analysis, the section on management compensation research rethinks the basics and reasons for CEO compensation plan design in more detail and discusses the research issues resulting from cross-sector samples. This chapter ends with the conclusion that different sectors show different preferences in their decision concerning CEO compensation plans and the selection of performance measures to define the targets for achieving full compensation. Furthermore, this chapter provides the conceptual framework for exploring the selected E&P industry by analyzing sector-specific business logics and business model requirements. The aim is to reframe the pay-for-performance discussion for this specific sector, as the focus on one sector is a pre-condition for consistent data analysis results.

2.1 Firm Performance Theories, Models, and Research

This section describes indicators for the measurement of firm performance, firm performance theories and the success factors for corporate growth.

2.1.1 Firm Performance Measurement Issues

Since firm performance is a multidimensional concept, the varying outcomes of the research result from different indicators used to measure performance:

- In a literature review, Delmar (1997, p. 5) found that revenue is the most frequently used performance indicator in growth research, being resorted to in 31% of the studies; however, revenue growth is only a meaningful KPI if it exceeds market growth in the respective business,
- Shepherd & Wiklund (2009, pp. 107–108) showed that 61% of firm performance studies apply revenue growth as a growth measure, and 15% use profit and equity/assets growth,
- Achtenhagen et al. (2010, p. 293) indicated that 42% of all studies examine revenue growth as an indicator for firm performance (see Table 2).

Table 2 Performance Indicators of Firm Growth Research

Variables	Percent
Sales/Turnover	41.8
Employees	27.3
Growth Intention	18.2
Profitability	7.3
Combination of previously mentioned measures	16.4
Growth Strategies	16.4

Source: Achtenhagen et al. (2010, p. 293)

In contrast, qualitative performance indicators are comparatively rare (Achtenhagen et al., 2010, p. 310), although a few studies used indicators such as Research & Development and innovation performance (e.g., Frenz & Letto-Gilles, 2009, pp. 1132–1133; Van Beers & Zand, 2014, pp. 202–203).

Therefore, it can be stated that the basic accounting-based firm performance measures are (1) the expansion of the business in the form of revenue growth and net income growth and (2) indicators reflecting the efficiency in the use of assets and capital, such as the ROA and the ROCE.

Achtenhagen et al. (2010, pp. 289–290) criticized the gap between what scholars measure as firm performance and what practitioners use as performance indicators. Management compensation indicators, for example, are based on a more complex concept of performance. At least six groups of management performance indicators are generally discussed in the literature (Winter, 1996, p. 109):

(1) Financial indicators (accounting-based indicators) such as profitability ratios (e.g., ROI, ROA), revenue growth, net income growth, and cash-flow growth,

(2) Market-based indicators such as economic value added (EVA), absolute and relative TSR,

(3) Economic value contribution of a strategy, business unit, or a company, measured by earnings power growth or net present value growth,

(4) Strategic performance factors such as market share growth, product quality increase or innovation rate increase,

(5) Leadership style, prudence, and preparedness to cooperate with others,

(6) Mixed approaches such as profitability measures and rate of innovation.

2.1.2 Theory of the Firm as the Basis of Firm Performance Theories

The factors of corporate growth have been the subject of business management research for about 60 years—since Penrose formulated a theory of corporate growth. Her theory contradicted the prevailing microeconomic approach at the time that focused on price, output, and demand. She emphasized the importance of the resources of a firm that stimulate and determine growth and she was a forerunner of strategic management, a discipline that was still in its infancy at the time she published her book in 1959.

In the 1970s, the PIMS study (Profit Impact of Market Strategies) was the first comprehensive empirical study that comprised a statistical analysis of success factors based on a large set of corporate data from sizeable industrial companies. The database project, which is still ongoing today, concluded that, in 75% of cases, the success of companies can be explained by 15 factors (Malik, 2008, p. 152).

Since the 1980s, success factor research has been further diversified into a whole range of special approaches. Beginning with the study "*In Search of Excellence*" by Peters and Waterman (1982), which was seminal in strategic management and identified seven decisive principles—always with people taking the central role—for good corporate governance, through the Hidden Champions studies by Simon (2007; 2012), which examined medium-sized companies up to EUR 3bn as typical representatives of the German SME (Small and Medium-sized Enterprise) sector, the most recent studies on success factor research have been devoted to so-called high-growth firms, i.e., small, fast-growing companies. These studies identified a multitude of different success factors, starting with the right strategic direction, a good product-quality relationship, competitive innovation, and a proper human resources policy (Amat & Perramon, 2010, p. 5), a specific niche strategy (Simon, 2012, pp. 158–162) or the firm-specific financing of resources and the resulting specific capital structure (López-Garcia & Puente, 2009, p. 29).

In addition to these studies, however, one branch of success factor research that still considers corporate growth to be a coincidence remains. The stochastic theory assumes that corporate growth cannot be traced back to a few discernable factors but rather encompasses a multitude of company internal and external factors which cannot be determined empirically (see Section 2.1.4).

2.1.3 Firm Performance Theories

Regarding the models and theories of corporate growth, at least four major theory fields can be distinguished (Gavinelli, 2016, pp. 95–100):

- Stochastic approaches, which describe corporate growth as a multifactorial relationship that cannot be explained by a few isolated observable internal (endogenous) and external (endogenous) factors (e.g., Gibrat, 1931; Botazzi & Secchi, 2003; Reichstein & Dahl, 2004), whereby corporate growth is largely stochastic and can therefore not be observed in the form of causal models,
- Deterministic resource-based models, which essentially assume the development of firm-specific resources by management as success factors for company growth, that lead to competitive advantages for example in

the form of core competencies, learning ability and unique services and products that differentiate one company from others and explain the heterogeneity of growth rates of different companies (e.g., Penrose, 1959; Wernerfelt, 1984; Hamel & Prahalad, 1994),

- Deterministic market-based models and models of strategic management, which assume that companies are mainly driven by the development of the market (development of the market structure and growth rates of the market) but also by strategic management decisions (e.g. Drucker, 1954; Mintzberg, 1994; Buzzell & Gale, 1989; Barney, 1991; Barringer & Jones, 2004; Davidsson & Delmar, 2006) regarding market positioning, creation of a comparative competitive advantage, pursuit of specific, generic strategies, increasing efficiency in operations and the exploitation of economies of scale by increasing market share (e.g., Ansoff, 1965; Porter, 1980; Simon, 2012),
- Life-cycle-based growth models such as company life cycle or evolutionary models assume that companies develop through predictable stages like living objects and that the resources, skills, structures, and strategies change with different phases of a firm's development (Aldrich & Martinez, 2001; Phelps et al., 2007).

In summary, most of the abovementioned models and theories of corporate growth assume that specific management activities are the cause of corporate growth. There are differences in the contribution to success by the weighting of (1) management as an overall factor, (2) individual management activities, and (3) the impact of external (exogenous) and internal (endogenous) factors. In this respect, the theories of corporate growth are a concretization of the theory of entrepreneurship by weighting the importance of production factors and other factors according to their relevance to success.

2.1.4 Stochastic Models

In his empirical research, Gibrat (1931) investigated the relationship between company size and company growth and found that the distribution of growth rates is independent of company size and past growth, under the so-called law of proportional effects. These observations are attributed to relatively constant unit

costs in the highly degressive region of the long-term average cost curve so that companies of any size have the same opportunity to grow or shrink relative to their current size. From a theoretical perspective, it can be assumed that growth is an essential component of the long-term success of companies. Therefore, numerous studies have tried to find out which factors are responsible for above-average growth, e.g., the so-called high-growth research in recent times or the PIMS study that is discussed in Section 2.1.6.

Empirical research has not provided unambiguous results concerning this, and thus questions the validity of the stochastic-based view of firms (e.g., Evans, 1987; Reichstein & Dahl, 2004) particularly because some research found that smaller companies grow faster than larger ones so that growth rates do not show a normal distribution in samples including companies of different firm size (Evans, 1987; Buldyrev et al., 2020).

The stochastic approach argues that a multitude of factors causes firm performance and none of them are sustainably dominant, which is why no factor model can be found that reduces the multitude to only a few showing a strong explanatory power. Therefore, firm performance must be considered as a stochastic process not only depending on strategy and firm-specific resources but also on a variety of other factors (Gavinelli, 2016, pp. 94–95).

Concerning the pay-for-performance link, the stochastic view of firm performance suggests that managers are at least partly paid for luck and not for performance. However, critics state that, although growth is sometimes observed as stochastic, the underlying process towards achieving growth must be considered as being deterministic (Relander, 2011, p. 65).

2.1.5 Resource-Based Theories

Within industrial economics, which is based on the neo-classical, microeconomic model of the firm, the management of a company is only given a subordinated role in attaining corporate success. According to this model, the success of a company is primarily determined by competition and the industrial structure. Active management as a core function of the firm is therefore largely neglected (Zobolski, 2009, p. 74).

The resource-based view critique of the neoclassical, microeconomic theory targets the strong simplifications and premises (Barney, 1991, pp. 100–101):

- It assumes equality of resource facilities and strategies of all companies within an industry. The market and the firm are information-efficient, and the transactions are frictionless, implying the absence of transaction cost heterogeneity and information heterogeneity (asymmetric distribution of information),
- A free tradability of strategically relevant resources is postulated so that competitive advantages resulting from unique (firm-specific) resources are not sustainable,
- The market entry of new competitors only leads to a short-term heterogeneity of the resource allocation of companies within a sector and, thus, only to a short-term competitive advantage and heterogeneity of firm performance.

From the resource-based perspective, it is precisely the different factors and resources of companies that lead to superior firm performance (Penrose, 1959, p. 5; Barney, 1991, pp. 100–101). In contrast to the neoclassical, microeconomic approach, the resource-based view assumes that among the totality of all resources available to the individual company, some significantly determine firm performance as a basis for a competitive advantage.

This enables companies to grow disproportionately and to be profitable in the long run, so that even companies within one sector show considerable heterogeneity in terms of the availability of resources and, thus, in terms of firm performance (Penrose, 1959, p. 5; Barney, 1991, pp. 100–102; Peteraf, 1993, pp. 179–180; Kraaijenbrink et al., 2010, p. 350).

Companies are therefore characterized by their individual strengths and weaknesses concerning the availability and allocation of resources. By implementing market-fitting strategies and building up new, success-relevant, firm-specific resources, management attempts to set itself apart from its competitors and to gain lasting competitive edges by taking advantage of market opportunities while avoiding or neutralizing risks and weaknesses (Penrose, 1959, pp. 4–5, 25, 85, 149–152; Burr, 2003, pp. 357–358).

Concerning the pay-for-performance link, the resource-based view would mean that managers are not paid for luck but rather for the development and extension of firm-specific resources that allow them to increase revenue and earnings.

2.1.6 Microeconomics, Management Activities, and Performance (Market-Based View)

Deterministic models consider firm performance as a result of external and internal (firm-specific) factors, whereby the focus of modeling firm performance is not limited to firm-specific resources but also encompasses the market structure in the positioning of the firm.

Porter (1980; 1985) states that cost advantages, differentiation, and/or positioning are the major sources of firm performance. Deterministic growth models consider market share as the main growth source, as it has the lowest cost that benefits from economies of scale and the highest profitability compared to that of competitors (Buzzell et al., 1975).

Whereas, as mentioned in the neo-classical microeconomic theory of the firm, management was only accorded a subordinated role in achieving corporate success, in more recent industrial economics the concept of strategic management brought the individual enterprise and management back into focus (Porter, 1980; Porter, 1985; Porter, 1990). In the early 1980s, the market-based view approach emerged in the scientific management literature. This approach focuses on market, industrial and competitive conditions, from which the basic strategic positioning for companies is derived. Industrial economics as an originally macroeconomic approach was increasingly dealing with the scope of action of individual companies and gained growing importance for business administration, especially strategic management (Buchholz, 2019, pp. 231–232).

Traditional industrial economics in the form of the structure-conduct-performance approach established a relationship between the factors market structure, market behavior, and the market result or firm performance (Buchholz, 2019, pp. 231–232; Stiele, 2008, pp. 55–57):

- The market structure is characterized by suppliers and buyers,

- The market behavior is reflected in the pricing policy and other competition-relevant behavior of the companies in the market,
- The market outcome is the result of the interacting behavior of competitors within the market structure and is realized as the profit margin of the individual company.

It can be assumed that companies in the same sector are, therefore, also structurally relatively homogeneous in the sense that there are only minor differences between the resources of companies, cost structures, returns, and management activities. The market structure and market behavior, as factors uncontrollable by the individual company, force homogenization to a certain extent.

The industrial economics paradigm, which emerged in the context of the origins of management as an academic discipline in the 1950s, can be considered as the origin of the market-based view. Drucker (1954, pp. 56–57) sees a business not as a combination of specific resources allowing for the generation of specific products but as an entity aiming only at creating satisfied customers. Thus, management research shifted from an inside-out view to an outside-in view, resulting in a differentiation of the market strategies such as Ansoff's (1965, pp. 98–99; see Table 3) product-market matrix that distinguishes four basic product-market strategies.

Many strategic management instruments and concepts follow Ansoff's change of perspective, such as the Boston Consulting Group product portfolio matrix (BCG matrix) or Porter's five forces concept (Porter, 1980). The end of the post-war upward cycle in the early 1970s showed that growth and profitability in saturated markets could not be achieved by simply adapting the allocation of resources and production capacities to the demand variance and by cost optimization as the long-range planning approach suggested (Schwenker & Spremann, 2008, pp. 121–122). Hence, the industrial-economics view shifted to the market.

The starting points for strategic management research are the observable differences between individual companies. These differences are more pronounced within individual industries than across industries (Rumelt, 1987, p. 141). According to Porter (1980, p. XV), the strategic performance of a company is essentially

determined by its industry structure and by the strategies pursued by the individual industry participants. Porter attributed the company's success to its positioning within the industry. By analyzing the entrepreneurial opportunities and risks and the resulting strengths and weaknesses of the company, strategies for the optimal positioning of the company in the competitive environment, i.e., the respective industry, need to be developed (Porter, 1980, pp. 34–40). The relative competitive position, and thus the attractiveness from the customer's point of view, are consequently improved by overall cost leadership, differentiation from competition, and a focus on key market segments and products (Porter, 1980, pp. 34–40).

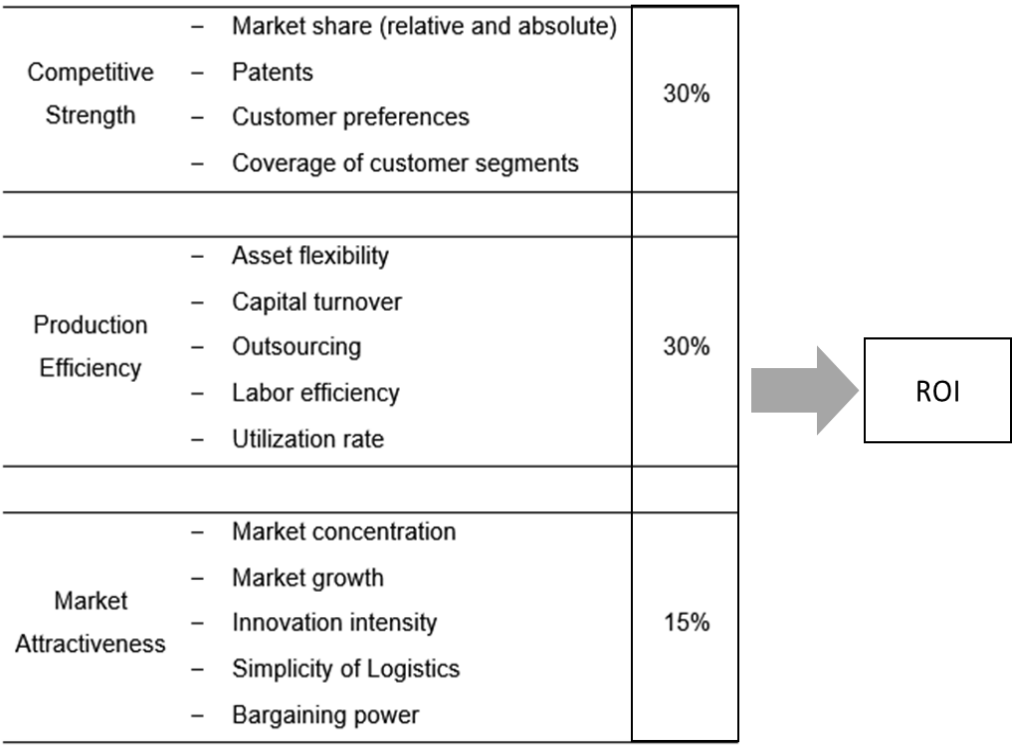
Porter also describes the risks associated with cost leadership as it imposes significant burdens to maintain such a position, the risk of differentiation as buyers' desire for the differentiating factor dwindles or imitation gets close to differentiation, and risks involving focus as competitors find submarkets and get more focused than the focuser (Porter, 1980, pp. 44–46).

Industrial economics in combination with Porter's concepts resulted in the framework for the PIMS panel that in turn provides partial empirical evidence for the market-based view and Porter's concepts, thereby showing that companies achieve a comparatively high ROI when holding a comparatively high relative market share or, with a low market share, if they attain a high relative product quality through differentiation (Malik, 2008, pp. 152–154). By focusing on crucial points, companies can acquire a relatively high market share in a market segment, even if they are small in relation to the industry as a whole. This explains why companies with a niche strategy can achieve high ROI values despite small market shares within the industry.

The PIMS panel originates from an internal General Electric research project in the late 1960s and aims at the identification of success factors determining profitability and growth by collecting a large amount of data from different industrial sectors over a long period (Homburg, 2000, pp. 57–67). The PIMS project has not followed a specific model or theory but was initially designed as explorative research on growth and profitability by examining a large amount of financial data (Buzzell & Gale, 1989, p. 29; Malik, 2008, pp. 148–150). Analyses of the growing

panel database have provided evidence for three factor groups explaining 75% of the ROI (see Fig. 1).

Figure 1 PIMS Panel Results: Factor Groups and Their Explanatory Power



Source: Author's presentation based on Malik (2008, p. 152)

The main conclusion of the PIMS data analyses is that high absolute and relative market share and high relative quality have the strongest effects on profitability. Higher market shares result in cost advantages due to scale effects in addition to higher bargaining power in the supplier market, with both supporting increased profitability (Buzzell et al., 1975, pp. 93–96).

The interaction between shifts in the markets indicated by changing price signals, the adaptation of the resource allocation by the firm's management, and the disposition on firm-specific resources explain growth rate differences, with market share or relative product quality as interchangeable key determinants. Management must decide on different growth strategies and paths in at least three dimensions (see Table 3):

(1) Product-Market strategies with the options: (1) higher market penetration with existing products in existing markets, (2) product development (new products for existing markets), (3) market trends (new markets with existing products), and (4) diversification (new markets with new products),

(2) Expansion direction with the options: (1) extending the value chain vertically or horizontally, (2) concentration on specific market segments and step-by-step market entry abroad, (3) conglomeration as diversification into new industries through M&A,

(3) Capacity expansion with the options: (1) external growth through M&A, or (2) organic growth by creating additional capacities within the existing company.

Table 3 Growth Strategies and Paths from the Strategic Management Perspective

Perspective	Growth Type
Product-Market Focus (Ansoff Matrix)	– Market penetration: existing products -> existing markets – Market development: existing products -> new markets – Product development: new products -> existing markets – Diversification: new products -> new markets
Product Portfolio Management (BCG Growth-Share Matrix)	Growth through – penetration strategy – skimming strategy – price-competition strategy – divestment strategy Growth is measured as relative market share (of products / SBUs) to market growth
Direction of Expansion	– Horizontal expansion (organic growth): range extension by similar products (product extension) – Vertical expansion (organic growth): increasing the added-value chain depth (value chain extension) – Concentric expansion (organic growth): diversification by entering new markets with similar products (new geographic markets), new industries (market extension) – External expansion (inorganic growth): acquisition of existing capacities (integration, mergers and acquisitions) – Internal expansion (creating additional capacity within the company)
Target	– - quantitative growth (e.g. revenue growth) – - qualitative growth (e.g. profitability increase)

Source: Author's presentation referring to Ansoff (2007, p. 73), Kotler et al. (2016, pp. 29–36, 62), and Gupta (2016, pp. 167–171)

Concerning the pay-for-performance link, the market-based view suggests that positioning and development as well as the extension of firm-specific resources that fit the existing markets or the enablement for opening new markets are key to firm performance and should, therefore, be incentivized. However, specific industry economics may not allow the firm's management to freely leave existing markets and enter new markets. This is particularly the case in old industries, such as the E&P industry, which must be considered as mainly following microeconomic laws as the companies are driven by demand changes and exogenous

factors serve to determine the price of the commodity. In such a case, it is questionable whether managers can really be paid for performance when important factors determining firm performance are beyond the manager's area of control.

2.2 Corporate Governance and related Topics

Corporate governance is about how public companies are structured and directed. All strategic decisions, activities such as dealing with operations, products, marketing, M&A, portfolios, financing, joint ventures, financial reports, financial systems, executive compensation, and community relations are part of corporate governance (Monks & Minow, 2011, p. xviii). It is of utmost importance for the proper conduct of the business and an essential criterion for well-performing and reputable companies. Corporate governance is a fundamental driver helping the company to attain its corporate objectives and to balance economic, social, and societal goals (Mallin, 2013, p. 7).

Corporate governance issues result from the fact that the various stakeholders are associated with the company by incomplete contracts, thus creating scope for opportunistic behavior. Corporate governance rules aim to reduce the risks and chances of such behavior (Vorbach & Rauter, 2015, p. 431).

Rating agencies clearly distinguish between companies with good and less good corporate governance. Large institutional shareholders invest only in companies with superior governance (OECD, 2011, pp. 20–21).

The classic agency problem, the various issues of corporate governance, and the design of incentive systems to align the interests of shareholders, boards, and executives are presented below.

2.2.1 Principal-Agent Issues

This section outlines the fundamentals of the principal-agent theory with the homo oeconomicus taking the central role, the main features of the new institutional economics, and the behavioral agency theory as an advanced concept to eliminate the rational choice assumption by agents.

2.2.1.1 Fundamentals of the Principal-Agent Theory

The economic “agent” (homo oeconomicus) is defined as a “unit” that uses production factors such as land, labor, capital, and information, usually (although not always) for their own benefit. An economic agent may either be an individual agent or an institutional agent, such as a company or a government, or even a whole society. Economic agents are assumed to be rational and make decisions to maximize their self-interest (maximum benefit or utility). In terms of the neoclassical theory of economics with the underlying model of the homo oeconomicus, the utility maximization is, thus, the core of neoclassical models, methodology, and premises (Altman, 2017, pp. 18–19).

The main characteristics of the neoclassical concept of rationality can be summarized as follows: The decision-maker (1) has unique, time-consistent preference structures and rules of action, (2) pursues subjective, individually determined goals, (3) has perfect, unlimited, instantaneous, and accurate information, and an unrestricted information processing ability (Altman, 2017, pp. 18–19).

However, rationality cannot be considered as an objectively verifiable capability (Eisenführ & Weber, 2003, pp. 4–5) and Hayek (1952, pp. 14–16) criticized the assumption of rational decision-making. He asserted that people basically have an anti-rationalist attitude. Therefore, Hayek’s criticism is in line with the behavioral finance approach that assumes limited rational behavior of decision-makers, which is the result of several main behavioral limitations (Frantz, 2020, pp. 14–15):

(1) Decision-makers have difficulties in distinguishing “true” from “false” information, and constructivism plays an important role as people actively construct their knowledge and use their previous knowledge as a foundation for new things that they learn, whereby they develop their own representations and incorporate new information into pre-existing knowledge (Watzlawick, 2002, pp. 9–10),

(2) Due to limited cognitive abilities, there is limited rationality (concept of bounded rationality),

(3) The behavior of decision-makers is marked by their socio-psychological backgrounds.

The new institutional economics (NIE) explores the effect of institutions on economic entities.

"New institutional economics abandons the standard neoclassical assumptions that individuals have perfect information and unbounded rationality and that transactions are costless and instantaneous" (Menard & Shirley, 2008, p. 1).

NIE dates to the article of Coase on "The nature of the Firm" written in 1937. However, the term "New Institutional Economics" was only coined by Williamson in 1975. Institutions are written and unwritten rules and agreements that determine contractual relations and corporate governance. In the NIE perspective, transaction costs are search and information costs, bargaining and decision costs, and supervision and enforcement costs (Sengupta, 2011, pp. 12–13).

The firm can therefore be viewed as an instrument for generating long-term contracts when the transaction costs of using the market are higher than the frictional costs within hierarchical structures.

Markets (outside procurement) and hierarchies (inside procurement) are alternative instruments (coordination regimes) for the coordination of resources in the economic process, which are both also relevant on the management level in make-or-buy decisions. The NIE assumes that economic agents are characterized by opportunistic behavior, generally aiming at utility maximization in the given coordination regime, which essentially affects the efficiency and effectivity of the economic results (Picot et al. 2003, pp. 38–45; Butter, 2012, pp. 56–57). The main inefficiency issues arise from three different areas described by the property rights theory, the principal-agent theory, and the transaction cost theory (Jensen & Meckling, 1976, pp. 4–7; Kim & Mahoney, 2005, pp. 223–237):

(1) The basic assumption of the property rights theory is that the results of economic activities are a product of the interactions of different individuals within an institutional framework provided by contracts rights of disposal and transactions,

(2) The principal-agent theory assumes that information asymmetries allow the opportunistic and selfish behavior of agents to use the principal's property more for their own utility maximization and to the disadvantage of the

principals. This issue is a result of suboptimal incentive mechanisms provided by the contractual framework,

(3) The transaction cost theory considers the information asymmetries as the basic reason for information inefficiency, resulting in inefficiencies in the principal-agent interaction, causing transaction and control costs, which can be—in extreme cases—higher than the use of a contractual relationship.

Incomplete contracts are the reason for transaction costs and control costs (Greve & Arcote, 2015, p. 485). The principal-agent theory offers theoretical concepts for explaining the actions of agents in institutions and for the design of contracts to reduce transaction costs (Jensen & Meckling, 1976, pp. 5–6).

The traditional solution for information asymmetries, hidden intentions, and actions in addition to the transaction and control costs that result from them are well-structured hierarchies. Bureaucratic control regimes based on regulated hierarchies are put into place to avoid such inefficiencies (Gailmard, 2014, pp. 10–20; Lubk, 2017, pp. 147–149). However, such control systems themselves are often also inefficient as they can only track what is defined as a relevant result of the agents' actions. Therefore, incentive systems are used to voluntarily achieve rule compliance by causing the desired behavior with the side effect of reducing control costs.

Moral hazard is a key reason for inefficiencies in the principal-agent relationship. Moral hazard means that individuals behave irresponsibly or recklessly due to economic maladministration and, thus, increase risk. Behavioral changes based on an insured risk apply as a standard example as agents can shift risk to the insurer. Moral hazard can arise whenever, as a result of entering a contract, the incentives of two parties change in such a way that the level of risk of the contract is altered. The principal requires resources to monitor actions and to penalize improper behavior. In simple situations, monitoring and supervision may be possible, however, often this is either impossible or very expensive (Hölmstrom, 1979, p. 74).

Depositors and shareholders may not monitor bank or investment management activities closely enough for several reasons. Firstly, the principal's effort in terms of monitoring the agent typically becomes low as the managed asset's value increases. Secondly, risk management policies or insurances seem to reduce the risk of moral hazard. The latter problem arises particularly when principals believe that corporate governance regulations or risk management procedures are strict. This explains the paradox that a strengthening of regulatory and supervisory policies sometimes increases the probability of moral hazards (Chesini & Giaretta, 2015, pp. 66–69).

Executive compensation is targeted to reduce agency costs of monitoring the agent's activities, usually in the form of an optimal contracting model (Deb, 2009, p. 359).

Several institutions, such as remuneration committees and independent directors on the board, should provide additional control levels to prevent excessive and dysfunctional management compensation schemes. However, particularly the 2008 financial crisis has shown that improperly structured compensation schemes were an important factor in causing this crisis (Sun, 2009, pp. 1–3), as is discussed in more detail in Section 2.3.

Earlier empirical research has not found evidence that executive compensation reduces shareholder agency costs and, in turn, enhances firm value (Attaway, 2000, p. 84). Since the 1990s, a growing volume of empirical literature has documented exponential increases in both incentive compensation and agent misinformation, especially in the context of earnings management.

Earnings management is the *"intentional manipulation of reported earnings by knowingly choosing accounting methods and estimates that do not accurately reflect the firm's underlying fundamentals"* (Sun, 2009, p. 2). Other pre-financial crisis research has provided evidence for firms that grant stock options and bonuses to exhibit a higher level of earnings management mainly by using accruals to increase or decrease reported income (Gao & Shrieves, 2002, pp. 3–4; Bergstresser & Philippon, 2006, p. 521).

Sun (2009, p. 27) has also provided evidence for earnings management being an unintended consequence of incentive pay. The managerial power model explains the positive association between misreporting and incentive payment as a labor contracting issue. According to Bebchuk & Fried (2004, pp. 61–62), the managerial power of executives is a major cause of principal-agent issues as they often control the compensation process.

2.2.1.2 Behavioral Agency Theory

Behavioral agency theory criticizes that the agency theory oversimplifies principal-agent issues by basing the modeling of such issues and the design of institutional and contractual structures on the homo oeconomicus concept (Pepper, 2015, p. 130). Therefore, the behavioral agency theory demands the inclusion of the agents' abilities and motivation to reconfigure the basic principal-agent model, which relies on the fiction of rational choice, by incorporating factors such as limited cognitive resources that result in bounded rationality, risk aversion, effects of extrinsic and intrinsic motivation, time discounting, and other determinants (Pepper, 2015, p. 130):

- While intrinsic motivation provides incentives that lie in the activity itself, extrinsic motivation is the result of external stimuli such as payment for performance,
- Risk aversion means that the individual selects the alternative with the lower risk from alternatives with the same outcome (expectation value),
- Time discounting entails that the individual discounts or valuates return or incentives depending on the payout or return time. Thus, later payments or returns are valued lower than timely rewards.

The "neoclassical" agency theory is considered as overemphasizing the alignment of interests between agent and principal instead of motivating the agents to use their capacities for performing best in the interest of the firm and, thus, in the interest of the principals. Consequently, the focus shifted from contract design to motivation factors and behaviors of people (Baddeley, 2017, pp. 8–12). The identification and improvement of the conditions for maximizing agent performance is at the center of the behavioral agency approach instead of institutional regulations to avoid agency risks.

Reducing motivation issues to a monetary incentive system design would be an oversimplified approach. The increase of the agent's motivation should be a key objective in the principal-agent relationship, which is not only accomplished by establishing monetary incentives, particularly in areas where managers need to assume large monetary risks. Thus, behavioral agency theory introduces the risk factor as the main contribution to and basic modification of the "neoclassical" principal-agent approach (Wiseman & Gomez-Mejia, 1998, p. 133; Eklund, 2019, pp. 75–78).

Individuals calculate gains and losses in relation to a subjective reference point. Investment managers, for example, carry out transactions connected with an uncertain future based on their subjective evaluations. Decision-makers are exposed to a decision dilemma, whereby they need to select between several alternative courses of events and actions resulting in different possible results (Laux, 2005, p. 164).

According to the decision theory, the starting point for decision-making processes is a clearly defined target system of the decision-maker's preferences (Eisenführ & Weber, 2003, pp. 15–19). In theory, decision alternatives are evaluated and optimized using an outcome matrix, representing the results of alternative actions (Laux, 2005, p. 166). However, in practice, agents in a risky environment make judgments led by their moods, apply different attitudes toward risk, shy away from admitting failures, have imperfect self-control, are susceptible to frames and cognitive errors, and exhibit preferences concerning utilitarian and value-expressive characteristics (Statman, 1999, p. 19).

Additionally, the limited cognitive abilities of people restrict the evaluation of all possible actions and events to determine probabilities of changes of contextual conditions (Eisenführ & Weber, 2003, p. 152), and, finally, the necessary information is never fully available. This results in several issues that influence the effectiveness of the principal-agent relationship between shareholders/principals and executives (Eklund, 2019, pp. 22–23):

- Executives have no control over a number of factors influencing the outcome of their activities,
- They tend to overestimate future gains and underestimate current losses,

- They assess information differently from shareholders, which results in differences regarding realizable and realistic targets and results.

This is why managers, in contrast to shareholders, generally prefer higher shares of fixed compensation over variable compensation components. Therefore, behavioral agency theory suggests that—in the interest of both parties—the alignment of interests must include risk-taking under the conditions of uncertainty. This can only be achieved by a balance between extrinsic motivation instruments and a substantial share of intrinsic motivation.

According to the goal-setting theory, the setting of proper goals is of utmost importance for people. To facilitate the understanding and achievement of targets and deadlines, goals need to be clear and specific, and they must be challenging to keep those involved engaged and focused to successfully undertake the work at hand. Commitment is another important aspect as people need to fully support the goals they are entrusted with, while feedback is required to ensure that tasks are on track to reach the goals. Complex tasks should be broken down into smaller sub-tasks to foster a feeling of achievement. Finally, goals should lead to satisfaction as a consequence of their attainment (Locke & Latham, 2002, pp. 706–709).

2.2.2 Corporate Governance

As described in the context of agency theory in Section 2.2.1, there is information asymmetry between agents and principals. Corporate governance research concentrates on two types of agency problems: (1) the interests of the board of directors and shareholders are assumed to be aligned (board makes decisions in the best interests of shareholders), however, the interests of executives are not aligned with the board and shareholders, (2) the interests of the board and management are assumed to be aligned (board feels committed to executives) but their interests are not fully aligned with those of shareholders (Armstrong et al. 2016, pp. 108–109).

There is no generally agreed-on definition of corporate governance. Some definitions focus on the separation of ownership and control at the top of the corporation, others focus on the control function of the board, while still others concentrate on a range of control mechanisms such as boards, incentive compensation,

company audits, credit rating agencies, regulators, media, and customers (Brickley & Zimmerman, 2010, p. 236). The OECD states that *"Corporate governance involves a set of relationships between a company's management, its board, its shareholders and other stakeholders. Corporate governance also provides the structure through which the objectives of the company are set, and the means of attaining those objectives and monitoring performance are determined*" (G20/OECD, 2015, p. 9). Larcker et al. (2007, p. 964) define corporate governance as *"set of mechanisms that influence the decisions made by managers when there is a separation of ownership and control,"* while Shleifer & Vishny (1997, p. 737) state that *"corporate governance deals with the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment".* In general, however, corporate governance can be viewed as the sum of all international and national rules, regulations, values, and principles that apply to companies and how they are managed and monitored, which comprise the legal and factual framework for the supervision of the management in the interest of all relevant stakeholders (G20/OECD, 2015, pp. 9–11).

2.2.2.1 Basic Considerations

Corporate governance is complex and includes compulsory and optional measures: compliance with laws and regulations, compliance with recognized standards and recommendations, and the degree to which firms internalize the regulations into their organizational and strategic options (Aguilera et al., 2013, pp. 35–39). Another aspect of corporate governance is the design and implementation of management and control structures, whereby the regulatory framework is largely determined by lawmakers and owners. The specific structure is the responsibility of the company boards. The company-specific corporate governance system is the result of the implementation of relevant laws, guidelines, codes, and the company-specific organization of corporate management and monitoring practice, particularly in the framework of comply-or-explain principles, which leave a large degree of design flexibility (Gerner-Beuerle & Schilling, 2019, pp. 273–284).

Regulations as the basis of corporate governance have the fundamental task of restricting the leeway and motivations of the actors for opportunistic behavior through appropriate legal and factual arrangements. The separation of powers

distributes the rights of disposal among several actors and, through the establishment of checks and balances, weakens power monopolies that could otherwise be misused and lead to opportunistic behavior that would harm stakeholder groups.

The top management is at the heart of the containment of conflicts of interest, which, due to its privileged power of disposition, has a particularly wide range of opportunities to place its own interests above those of the company. In this context, one of the key regulatory issues is the transparency of business disclosure to reduce information asymmetries between the various stakeholders of a company (Clarke, 2017, pp. 129–130). Another issue is the appropriate level of incentives for aligning management's and the shareholders' interests.

It is assumed that the control of activities and performance by the board of directors and the use of pay-for-performance incentives affect the management's intrinsic and extrinsic motivation so that it is acting in its own interest, which also leads to the satisfaction of the shareholders' interests while the chance of opportunistic behavior is reduced. The main factor is to build on material incentives (Nyberg et al., 2010, p. 1030).

The governance discourse assumes that good corporate governance affects firm performance in a positive way (Bhagat & Bolton, 2008, p. 15). Although the positive association between good corporate governance and firm performance appears plausible at first sight, it is difficult to prove this link empirically because firm performance itself is—as the discussion in Section 2.1 has shown—the result of a multitude of factors (Skare & Hasic, 2016, pp. 45–46).

2.2.2.2 Governance Regimes (Types of Governance Systems)

The principles of corporate governance and corporate oversight are traditionally set at the national or supra-regional level (e.g., the European Union (EU)). For this reason, different corporate governance systems have emerged in practice with characteristics emanating from the specific socio-cultural, legal, societal, and historical context of the respective country or region (Welge & Eulerich, 2014, p. 159; Hirota, 2015, p. 113–116). Corporate governance systems include a variety of regulations and elements. A governance system is a specific combination of

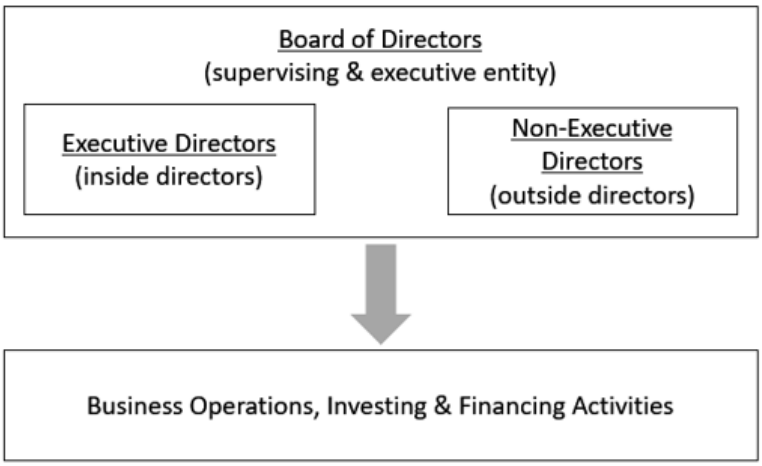
these elements that define the obligations, rights, and limitations of the defined actors and entities.

Generally, corporate governance systems aim to foster and maintain strategic focus, predictability, transparency, participation, accountability, efficiency and effectiveness, and stakeholder satisfaction (Bhandari, 2018, pp. 8–10). In international comparisons, there are different systems for the management and supervision of a stock corporation, which essentially differ in the distribution of the control and management functions to the governing bodies. Basically, two corporate governance systems can be identified: the monistic and the dualistic systems (Magnier, 2017, pp. 140–141). While the monistic system, which is prevalent in the Anglo-Saxon countries, combines management and control functions in one entity, stock corporations e.g., in Germany and Austria, are subject to the dualistic system, in which the functions are strictly separated. The main features of these corporate governance systems are presented in the following paragraphs.

a) One-tier system (see Fig. 2): The Anglo-Saxon system of corporate governance is characterized by a single entity of corporate management and control; the board of directors comprises executive and non-executive directors. The companies included in the sample of this thesis are all subject to the one-tier-system regime as they follow the US respectively Canadian rules and regulations.

In the one-tier system, the board of directors is elected by the shareholders' meeting which results in a strong shareholder orientation of the board. Due to the large influence of the shareholders on corporate governance, the term "market governance system" is also used to characterize the one-tier system (Welge & Eulerich, 2014, p. 39).

Figure 2 One-Tier Governance System



Source: Author's presentation based on Welge & Eulerich (2014, p. 41)

The board of directors executes both the management and the supervisory functions, whereby the management functions are performed by "inside directors" (executives), and the supervisory responsibilities are executed by "outside directors" (non-executives). The executive directors are responsible for the strategic management, business operations, and the outside representation of the company whereas non-executive directors—usually representing the majority of all board members—are independent of the company as it is their task to supervise management activities (Welge & Eulerich, 2014, pp. 39–40).

From among their members, the board elects the chief executive officer (CEO) who is authorized to manage the company. In addition, the board members elect the chairman of the board who may also be the CEO, thereby concentrating a great deal of power in a single person. AGMs are meetings of shareholders and take place at regular intervals. Shareholder meetings have both control and appointment and dismissal competences regarding the board members. The issuing of so-called bylaws, which constitute the articles of association, is also the task of the shareholder meeting (Welge & Eulerich, 2014, p. 40).

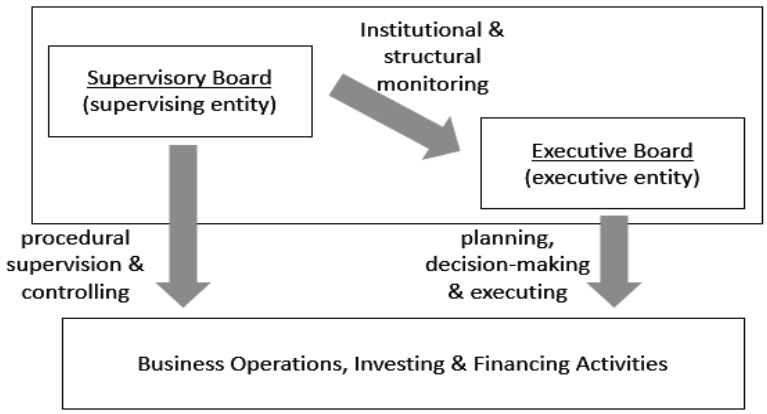
In business practice, the formation of committees to perform various tasks and increase the efficiency of board activities is common. The most common committees are the audit committee entrusted with the task of financial controlling and

preparing the annual financial statements, the remuneration committee responsible for the remuneration policy and remuneration plan, the nomination committee tasked to propose appointments to the board, and the executive committee that deals with the generic management activities (Kolev et al., 2019, pp. 1139–1141).

In the US, regulations and company law are the responsibility of the individual states, and each state has its own legislation and jurisdiction for registered public corporations. However, with the enactment of the Sarbanes-Oxley Act (SOX) in 2002, federal regulations have been created to ensure the reliability of the reporting of listed companies, to tighten the liability of the CEO and chief financial officer (CFO), and to improve the coordination of the committees for increasing the independence of board members and auditors (Jackson, 2010, pp. 11, 39–41).

b) Two-tier system (see Fig. 3): In contrast to the one-tier system, the dualistic system that applies, for example, to German and Austrian stock corporations is characterized by a strict separation of the executive and supervisory tasks. The supervisory function is performed by the supervisory board and the management function by the executive board.

Figure 3 Two-Tier Governance System



Source: Author's presentation based on Welge and Eulerich (2014, p. 42)

The dualistic system not only considers the interests of shareholders but also allows for the interests of the various stakeholders to be taken into account. The legislation also governs the composition of the supervisory board, which includes employee interests by having employee representatives on the board (Welge & Eulerich, 2014, p. 41). In Germany, the AGM of the shareholders elects e.g., only 50% of representatives to the supervisory board in companies with more than 2,000 employees, while the other 50% are representatives of the employees according to the Co-determination Act (Geffers, 2016, p. 32). In Austria, employee representatives make up one-third of the members of the supervisory board (Koidl, 2016, pp. 10–11).

This form of stakeholder governance and the separation of management and supervision are considered strengths of the two-tier system and it assumes long-term relationships between different stakeholder groups and the balancing of different interests as a result of this approach. However, critics claim that the provision for the interests of the stakeholder groups makes targeted corporate management more difficult and that the quality of the supervisory board's work depends on the information provided by the executive board (Welge & Eulerich, 2014, p. 41–42).

2.2.2.3 Governance Mechanisms

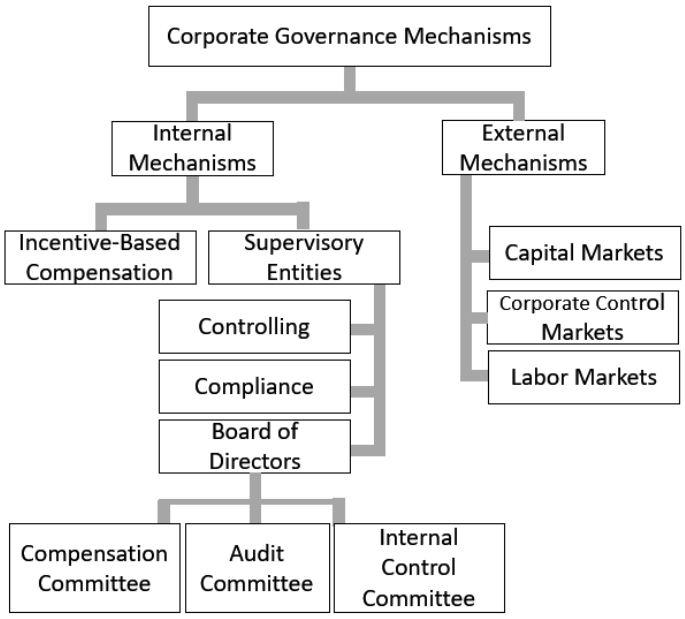
As was mentioned in the discussion of previous sections, the separation of ownership and leadership provides the basis for systemic governance issues. Such corporate governance issues are usually based on information asymmetries between owners, supervisors, and the management. To effectively counteract these issues, it is the objective of corporate governance systems to provide suitable solutions to realize good governance, which generally aims at avoiding information asymmetries or at least establishing mechanisms that make information asymmetries more controllable by reducing their extent and the resulting power differentials (Becker & Ulrich, 2010, p. 16; Elbadry et al., 2015, pp. 128–129).

Accordingly, it is up to the shareholders to create structures (internal governance mechanisms) that ensure that corporate control and management are not performed by the same person, that the board members have the required qualification level, and that incentive-oriented contracts are agreed on with management.

If these internal mechanisms fall short, external governance mechanisms should reduce the information asymmetry. Internal mechanisms differ from external mechanisms insofar as their realization takes place through the contracting network within the company (Rezaee & Fogarty, 2020, pp. 367–372).

The external corporate governance mechanisms describe the general influence that the market has on the actions of management. The following three mechanisms can be identified: (1) manager's labor market, (2) capital markets, and (3) corporate control market (see Fig. 4).

Figure 4 Corporate Governance Mechanisms



Source: Author's presentation referring to Diederichs & Kißler (2008, p. 28) and Welge & Eulerich (2014, p. 72)

(1) Labor market for managers: The efficiency of the labor market for managers as an external governance mechanism depends to a large extent on the labor market's transparency regarding the information on the qualifications, performance, and personal preferences of managers and their successes or failures in previous activities (Welge & Eulerich, 2014, p. 72).

If these assumptions are met, the external and internal disciplining effects can be applied (Diederichs & Kißler, 2008, pp. 29–33; Welge & Eulerich, 2014, p. 73):

- External disciplining effects are assumed by the prevailing competition between managers as they can be replaced through contract termination based on a rigorous performance evaluation. Due to the latent risk of job loss, which is often associated with loss of reputation, managers are encouraged to act in the interests of the principal (owners or shareholders).
- The mechanism of competition within companies can also be assumed as an internal disciplining effect in the form of pressure exerted on higher-ranked executives in the company. It is not only the horizontal competition of management, but competition also takes place vertically between the middle and top management levels.

The top management is in a continuous competitive situation with external third-party managers and internal staff, which fosters a compliant action in the interests of shareholders. In North America, the market for managers is characterized by a particularly high degree of transparency concerning compensation and individual performance (Baker et al., 2019, pp. 4–7). What counters the efficiency of the labor market as a governance mechanism, especially in the US, are situations where the CEO is also Chairman of the Board as such a combination provides the top person with an extraordinary degree of power.

(2) Capital markets: The capital markets are considered as the most important external mechanism as they are usually efficient, and information is processed and included in the stock price so that investing activities of shareholders as a consequence of management activities must be expected. Dissatisfied shareholders sell their shares and, as a result, the stock price falls, which should influence both the behavior of management and the board (Haque et al., 2008, pp. 264–266).

Moreover, shareholders can provide themselves with information through monitoring activities. Generally, such monitoring activities are supported by major shareholders, capital market analysts, and rating agencies (Diederichs & Kißler, 2008, pp. 33–36).

Rating agencies play an important role when companies take up loans (Bourne, 2012, pp. 138–141). Many public companies are dependent on bank loans, which is why, apart from the shareholder structure, the capital structure has a noticeable influence on corporate governance (Jiraporn et al., 2011, pp. 208–210). While banks are also geared towards the long-term preservation of the company, they and shareholders differ in their assessment of management activities—such as capital structure decisions, investment activities, and dividend policy—as banks prefer the continued repayment of interest and principal whereas shareholders favor dividend payments and value-generating investments (Welge & Eulerich, 2014, pp. 73–74).

(3) Corporate control market: The market for corporate control as a governance mechanism is based on the disciplining effect from takeover threats and potential acquisitions (Jensen & Ruback, 1983, pp. 1–3), and the gap between the potential market value and the actual share price can exert a disciplinary role on top managers. If this gap is large, there is an acute risk of the company getting acquired. This possibility is enhanced when underperformance can be eliminated through a change of management which would facilitate a rapid increase in the market value (Wang & Wu, 2020, p. 858). Moreover, proxy investors, governance rating agencies, external auditors, and governance regulations supplement the control capacities of stock investors and their rights to determine and enforce shareholder interests (Schouten, 2012, pp. 2–3; Bourne, 2012, pp. 136–137).

In addition to the external corporate governance mechanisms, internal governance mechanisms fulfill a comprehensive internal control function to increase governance quality, mainly by (1) incentive-based compensation, (2) the board of directors and its committees, and (3) other internal governance entities (see Fig. 4).

(1) Incentive-based compensation: The target of an incentive-based compensation policy is that managers link their services to the interests of shareholders (Brickley et al., 1985, p.116). Consequently, the pay-for-performance objective is that the linkage of compensation to management performance serves the interests of shareholders, reduces the information asymmetries, and decreases agency costs (Morgan & Poulson, 2001, pp. 490–491).

However, as firm performance not only depends on the effects of management activities but is also impacted by incalculable environmental (exogenous) factors, pay-for-performance plans must find a balance between fostering entrepreneurial risk-taking and the interests of shareholders to increase value and returns (Welge & Eulerich, 2014, pp. 75–76).

(2) Supervision and control entities: External mechanisms and incentive-based compensation cannot completely solve the problem of information asymmetries. In the two-tiers framework, the supervisory board represents the main form of executive control. Supervisory boards can establish an efficient information and control system to improve the information on the firm's economic and competitive situation, management activities, and financial stability (Günther, 2004, pp. 35–36). The basis for this control is a comprehensive information obligation of the executive board to the supervisory board, which must be informed broadly, truthfully, and in good time about all relevant company-specific issues (Diederichs & Kißler, 2008, pp. 43, 107–109).

In a one-tier system, challenging issues can arise if the functions of the Chairman and CEO are fulfilled by one person, as this entails a factual lack of separation between leadership and supervision and can make it difficult to control the executive.

It must be stated, however, that the combination of Chairman and CEO faces widening criticism and is therefore increasingly being abandoned by listed companies in the US. According to data compiled by the Wall Street Journal, the proportion of Standard & Poor's 500 companies whose CEOs were also Chairmen fell from 70% in 2005 to 46% in 2018 (Sun, 2019). To meet requirements for adequate information and control of US public companies, the Audit Committee must consist of independent (outside) directors only (Merkt & Göthel, 2006, p. 325).

In Canada, the separation of the Chairman/CEO function is far more advanced, as 84% of TSX-listed companies already had a Chairman/CEO split in 2013 (Spizzirri, 2014, p. 1).

The establishment of committees is another essential supervisory and control instrument in both the one-tier and the two-tier systems (Rezaee & Fogarty, 2020,

pp. 461–487). Control and supervisory tasks are increasingly delegated to business units, including internal governance entities for controlling, risk management, compliance, and internal revision. Thus, information for the board is generated and aggregated, continuous company monitoring is possible, whereby facts are checked for their functionality, effectiveness, and conformity (Tricker, 2012, p. 115; Rezaee & Fogarty, 2020, pp. 543, 639–640, 669–670).

In the US, the Sarbanes-Oxley Act of 2002 (SOX) has tightened management liability rules. CEOs and CFOs must make legally binding declarations on the correctness of the financial reporting, and false declarations can be punished with a prison sentence of up to 20 years (Forster, 2005, p. 511). Companies can exclude the liability of their directors if they have acted in good faith and gross negligence cannot be proved (care of duty and care of loyalty) and case law protects the directors when they have made their decisions with a clear conscience (business judgment rule) (Sharfman, 2017, pp. 28–29).

Transparency can be considered as one of the most important control principles. The US stock exchanges and the United States Securities and Exchange Commission (SEC) place high demands on timely and detailed reporting. The same goes for the relevant Canadian institutions. Examples include strict ad-hoc disclosure requirements, directors' obligation to report or direct reporting by the audit committee, and the compensation committee to shareholders (proxy statement reports) (Rezaee & Fogarty 2020, pp. 466, 477–478). In these proxy statements, impending risks must be listed in detail. Companies are also required to disclose the compensation of their CEO, CFO, and three highest-paid officers (Ising et al., 2016, pp. 4–5). The media, financial analysts, and institutional investors receive detailed information in the form of analyst and investor meetings, conference calls, and roadshows, which are professionally prepared, evaluated, and published (Gebhardt & Strecker, 2017, pp. 81–83).

Moreover, the Generally Accepted Accounting Principles (GAAP) can be considered as the accounting standard that best meets the public disclosure requirements of shareholders (McEwen, 2019, pp. 17–19). The SOX has helped to increase transparency and to sanction non-compliance with transparency rules. In regard to the pay-for-performance issue, it should be noted that the SOX, and particularly the 2010 Dodd-Frank Wall Street Reform and Consumer Protection

Act, aim to link firm performance and management compensation. The Dodd Frank Act is a US federal law that was passed in response to the drastic consequences of the 2007/08 financial crisis. It mandates inter alia that the compensation committee of a public company consists of independent members only and that there is a "say on pay" vote that gives shareholders a non-binding vote on the compensation of the named executive officers (CEO, CFO, and top three other most highly compensated executive officers). This was an effective measure to reduce excessive remunerations and to better align executive pay with the interests of shareholders (Anand, 2011, p. 130).

As this thesis' empirical research comprises both US and Canadian companies, it should be mentioned that Canadian companies generally raise capital in the US as the largest global capital market in proximity and that the US regulations required by the SEC, including the regulations stipulated by SOX and the Dodd-Frank Act, are thus also implemented by most Canadian listed companies (Osler, 2020, pp. 7–8). Canada's large companies are adopting US governance practices because they are also listed on US stock exchanges. Almost two-thirds of TSX 60 issuers are listed on a US exchange, typically the NYSE. Canadian companies want their US shareholders and US analysts to understand that their governance practices largely follow the standards required by US domestic issuers (Davies, 2011, p. 13).

Finally, it is important to mention that the factor markets and the sales markets also exert a certain effect on governance practices but are not governance mechanisms asserting control on the management in the sense of reducing information asymmetries or limiting opportunistic behavior or moral hazard. However, both markets have a disciplining effect on management, as permanent competition forces them to use resources efficiently and to achieve a solid long-term performance to prevent shareholders from liquidating the company through asset sales, equity sales, splitting up, or mergers (Welge & Eulerich, 2014, p. 75).

2.2.3 Incentive System Design

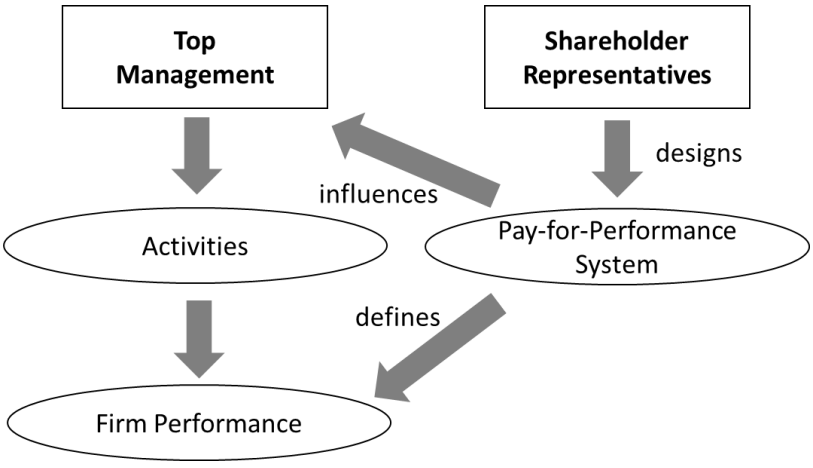
Top managers should—following the homo oeconomicus concept and the rational choice approach—be guided by goals that influence their compensation,

however, as Wallace (1997, p. 276) puts it, "*you get what you measure and reward.*"

"Goals affect performance by affecting the direction of action, the degree of effort exerted, and the persistence of action over time" (Locke, 1996, p. 120). Executives with clear-cut goals will maximize their quality of performance and will be focused on achieving them.

Top managers make strategic decisions based on various criteria, and preferences as well as self-interest-oriented goals that differ from shareholder interests play a vital role in the decision-making process. Therefore, proper variable compensation components should stimulate the alignment between the individual objectives of top managers and the interests of shareholders (see Fig. 5). The strategic decisions made are likely to determine the development of the company and should, therefore, be recognized as profit or loss. The resulting company performance, in turn, determines the remuneration of the top managers; the higher this turns out to be, the greater the benefit the actors gain from employment with the company. All in all, it can thus be said that top managers will especially weigh their decisions against the background of the effects of their activities on their compensation which is defined by the pay-for-performance scheme designed by the remuneration committee. This committee is established by the board and should represent the shareholder interests.

Figure 5 Pay-for-performance in the Corporate Governance Context



Source: Author's presentation

It is an important task of the remuneration committee to define key performance indicators that best measure firm performance to further the alignment with shareholders. Likewise, proper targets need to be defined for motivating managers through well-designed compensation plans. Compensation plans should provide incentives for a specific behavior and should attract the right staff at the lowest cost, motivate the staff to generate long-term value, and prevent activities that could destroy value (Marquart, 2004, p. 2).

Compensation is provided for services rendered such as skills, effort, and time consisting of fixed payments (mostly in the form of a base salary), variable payments (incentive pay tied to levels of performance), occasional gratuities, perks, and other components paid in equity or cash in return for work during the accounting period (World-at-Work, 2007, p. 293).

Performance controlling systems should not only include planning, control, information, and accounting components but also compensation plans linked to targets (Lawler, 1990, pp. 57-58).

The overarching principles of an executive compensation plan are (Willis Towers Watson, 2020, p. 7):

(1) Purpose: what is the mission of the company, what is the strategy and its objectives? Purpose answers the questions: Aligned with what? Engaged toward what? Accountable for what?

(2) Alignment: touches the essence of agency theory by matching management's interests with shareholders' interests.

(3) Accountability: addresses the relationship between compensation, organizational performance, and individual actions.

(4) Engagement: refers to main elements and targets of compensation by motivating managers, directing their behavior, binding them to the organization, retaining them, and focusing on performance, responsibility, competency, and experience. Challenging goals stimulate engagement and the motivation to excel in performance.

To realize these principles and to achieve the incentive objectives, a compensation plan should consist of several components including short-term and long-term incentives and an individual base salary that reflects the professional experience and task-specific requirements and balances the interests between stakeholders, shareholders, and executives (Willis Towers Watson, 2020, pp. 8–9). Thus, a balanced compensation plan follows the “logics” of individual performance, the “logics” of supply and demand, and the “logics” of balance of interests. One of the major compensation plan issues is that of performance measurement and, particularly regarding individual performance, the question arises how to evaluate performance and measure target achievement (Sarkar, 2014, pp. 87–88).

Thus, compensation plans can be considered as the main internal instrument to exercise a controlling influence on management decision-making in the interest of relevant stakeholders. According to the findings of the motivation theory and those of the agency theory, it can be assumed that firm performance increases through management activities and the positive effect of incentives defined in the compensation plan. Monetary incentive systems should serve as a behavioral control instrument in relation to managerial decision-making (Demartini, 2014, p. 184). This control function is postulated by the pay-for-performance paradigm following the logic of rewarding performance-increasing decision-making behavior (Gillenkirch, 2008, p. 7).

Consequently, the remuneration policy of boards should result in managers making their decisions in line with shareholders’ interests as the outcome of a specific compensation plan. However, such alignment of interests needs to include metrics beyond accounting or market-oriented performance indicators as variables for the compensation plan design. The integration of corporate social responsibility (CSR) criteria in executive compensation, which entails the linkage of executive compensation with social and environmental performance, is gaining increasing importance. Such environmental performance could include emission targets, employee and customer satisfaction, ethical compliance, or health and safety performance (Flammer et al., 2019, p. 1098; Knauer et al., 2020, pp. 59–65).

A central prerequisite for facilitating the alignment of interests between managers and shareholders is that managers orientate themselves in a large part on their financial well-being. Under this assumption, the objectives and interests of owners and managers can potentially be harmonized, although this only happens if the preferences of managers and owners match. Since a universally valid preference structure cannot be construed for either a “representative shareholder” or for a “representative manager”—among other things because of the difficult, sometimes impossible, recording of non-financial interests in the decision-making calculus—this condition can never be fully met (Gillenkirch, 2008, pp. 8–9).

As a widespread potential solution, the value-based management approach suggests that the compensation plan should correspond to the requirement of making managers owners. The satisfaction of the self-interest of the top managers is thus linked to the achievement of the shareholder goals; this approach is believed to result in the desired adjustment of manager behavior (Devers et al., 2007, p. 1025).

However, overall, it is important to highlight that the effectiveness of the goal alignment by remuneration systems has not been clarified beyond all doubt. Thus, Devers et al. (2007, pp. 1017–1021) noted that a large proportion of the contributions in the relevant field of research established a lack of incentive effect of established compensation plans. This goal misalignment seems to be one of the most prevalent results of remuneration research. Consequently, direct behavior-influencing factors in the context of strategic compensation have recently gained attention. This branch of research is referred to using the phrase “pay-for-behavior” (Devers et al., 2007, pp. 1025–1028), and it is aimed at explicitly rewarding a specific behavior desired by the company, such as intensive investment activities. As examples of this research field, the effect of stock-based compensation components on long-term R&D investment (e.g., Rapp et al., 2012, p.18) or on the degree of transparency of a company, which, in turn, can serve as an indication of a shareholder-friendly business policy, is examined (e.g., Nagar et al., 2003, pp. 307–308).

2.3 Pay-for-Performance: Empirical Research

This section describes the components of compensation schemes, as required by regulations in the US and Canada, the empirical findings concerning the relationship between management compensation and performance and pay-for-performance issues in the oil industry.

2.3.1 Compensation Scheme Components

Executive compensation needs to be disclosed to authorities and shareholders in proper forms. In the US, this is through the proxy statement, which must be filed with the SEC, while in Canada the system of security regulation is different as each province and territory has its own regulator. However, they cooperate in the form of the Canadian Securities Administration.

Proxy statements in the US must be filed by publicly traded companies to the SEC as form DEF 14A ("definitive proxy statement") before meetings of shareholders and can be found in the SEC's database, which is called EDGAR (electronic data gathering, analysis, and retrieval) system (Investor.gov, US SEC).

In Canada, firms that trade on the Canadian Stock Exchanges are required to disclose information to SEDAR (system for electronic document analysis and retrieval). The equivalent to form DEF 14A is the Management Information Circular (MIC) (Strategic Corporate Research, 2021).

The DEF 14A in the US and the MIC in Canada contain the Summary Compensation Table (SCT), which shows all compensation components for each of the last three completed fiscal years for the Named Executive Officers (NEOs). These are the CEO and CFO and the three most highly paid executives of the company (Willis Towers Watson, 2020, pp. 4–5, 21–22).

At first, within the framework of the design of remuneration systems, the desired division between fixed and variable compensation components needs to be defined. The fixed compensation, usually paid monthly in equal installments, is referred to as base salary and is mostly based on the specific job requirements and relevant comparative values of competitors (Ellig, 2007, p. 5). In addition to ensuring a minimum work performance, the fixed income also plays an essential role in terms of providing security for top managers as at least part of the total compensation is protected against uncontrollable developments, if for example

an ex-ante promising investment is made but develops negatively due to unforeseeable environmental changes (Gray & Cannella, 1997, p. 519). Also, in corporate reality, fixed compensation may be regarded as a kind of insurance, since top managers can make their decisions—at least in part—independently of short-term performance goals (Balsam, 2002, p. 75).

Regarding the motivation and control objectives of a remuneration design, the use of variable remuneration components is of particular importance. The possibility of increasing the variable compensation by means of a quantitatively higher and/or qualitatively better service provision represents a worthwhile target for top managers. To effectuate that variable compensation components achieve their full potential, diverse requirements regarding the assessment basis must be met. An example is a condition that extrinsic incentives must be rigorously linked to the individual performance since only then do they achieve their full motivational effect (Frey & Osterloh, 2002, p. 248; Fehrenbacher, 2013, pp. 3–4).

In addition to the positive effects of a variable compensation on the willingness to perform, the risk attitude of executives needs to be considered. Variable compensation generally increases the compensation risk for top managers due to the uncertain nature of these components; at the same time, the chances of obtaining high incomes increase, which may encourage risky decisions. It is difficult to make a clear statement about the impact in terms of risk, as it is extremely complex and case-specific (Ellig, 2007, pp. 7–8).

Following the agency theory, the resulting conflict of objectives cannot be fully resolved: Top managers are, by assumption, risk-averse, and differ from shareholders in this point. This assumption implies that the full allocation of the risk to shareholders would be optimal through a fully fixed salary. In this case, however, no motivational effects can be achieved as risk-averse top managers will expect a kind of compensation for the assumed risk. This can take place, for example, in the form of a higher fixed or total compensation, which, however, reduces the profit made by the shareholders (Balsam, 2002, p. 61). The objectives of optimal motivation incentives and risk-sharing compete with each other (Gillenkirch, 2008, p. 8).

Remuneration system design can be considered as a core instrument for influencing behavior at the top management level, and the following passages distinguish different compensation components according to the time horizon of their incentive effect because the time horizon of the company and managers often differs. Managers are generally more short-term oriented, while short-term success often fails to generate a successful business development in the long run (Bebchuk & Fried, 2004, p. 136).

Pursuing long-term pay strategies is of paramount importance for sustainable and successful corporate development (Willis Towers Watson, 2020, pp. 16–17). Influencing time preferences should, therefore, be at the heart of any compensation design, primarily through the installation of long-term incentives (Gomez-Mejia et al., 2010, p. 30). However, in corporate reality, a reasonable mix between short-term and long-term compensation elements must be defined to adequately motivate managers (Gomez-Mejia et al., 2010, pp. 202–203).

In accordance with the research question and research aim of this thesis, only monetary (financial) incentives are considered as financial incentives are commonly used instruments to satisfy the needs of people. However, there are also non-monetary awards beyond pay that are increasingly expected by younger generations of managers as compensation for work such as flexible work time, telecommuting, professional development, access to leadership, recognition, and mentoring (Berger & Berger, 2008, pp. 167–172).

Determining the absolute amount of compensation is difficult, especially for executives, and companies usually follow the compensation packages paid on the respective markets (Winter, 1996, p. 99). External consultants (remuneration consultants) who have a better overview of the standard market terms are often used to determine the appropriate compensation for managers (Mallin, 2013, pp. 205–206).

The appropriateness of the variable remuneration elements is a central aspect when designing a compensation system. The amount of the variable remuneration is an essential aspect of whether a defined compensation system can fulfill its targets as expected and also indicates the degree of performance orientation of a remuneration system (Mallin, 2013, pp. 253–254). However, a high variable

remuneration component means that executives have a large variance in their income with the consequence of a greater reward risk than in the case of fixed compensation. Given the right amount of compensation, which depends on the specific person targeted by an incentive system, in most cases managers take the opportunity to increase their compensation through individual performance (Bernard, 2006, pp. 79–80).

However, since agency theory fundamentally presumes a risk aversion of the agent, it allows compensation for the assumption of a part of the entrepreneurial risk. The variable compensation components should, therefore, allow the agent to receive higher total compensation than in the case of a completely fixed compensation but they should also include a meaningful risk-free fixed component to avoid extreme risk aversion (Eklund, 2019, pp. 22–23).

To date, there is no consensus on the optimal amount of the variable compensation component in literature and research. Dependent on the situation and the individual, a proportion between fixed and variable elements of 40% to 60% is recommended (Eklund, 2019, p. 40). It is also assumed that the variable remuneration develops its effects only above a certain minimum threshold of 15% to 35% (Lawler, 1990, p. 58).

However, all recommendations on the amount of variable compensation appear to be rather arbitrary in practice. As a rule of thumb, the following considerations are suggested as being relevant in the determination of the share and volume of the variable compensation component (Bernard, 2006, pp. 79–80):

- The more independent the personal performance of an employee is from external factors, the higher the variable compensation component can be, as a performance increase of the employee then has a direct effect on the company result and on the absolute amount of the variable remuneration.
- Firms with riskier business models should not make use of excessive risk-sharing by increasing the fixed share of the total compensation to avoid excessive risk-taking.
- The higher the risk aversion of an individual, the lower is the acceptance of an incentive-based compensation system. In the case of substantial risk aversion, the variable compensation component should, therefore, initially

be set low, until the manager has achieved a certain degree of acceptance through positive experiences. Positive experiences increase the willingness to assume risks and people subsequently agree to a defined incentive compensation system. These considerations entail, in practice, that the variable remuneration component rises with increasing hierarchy level.

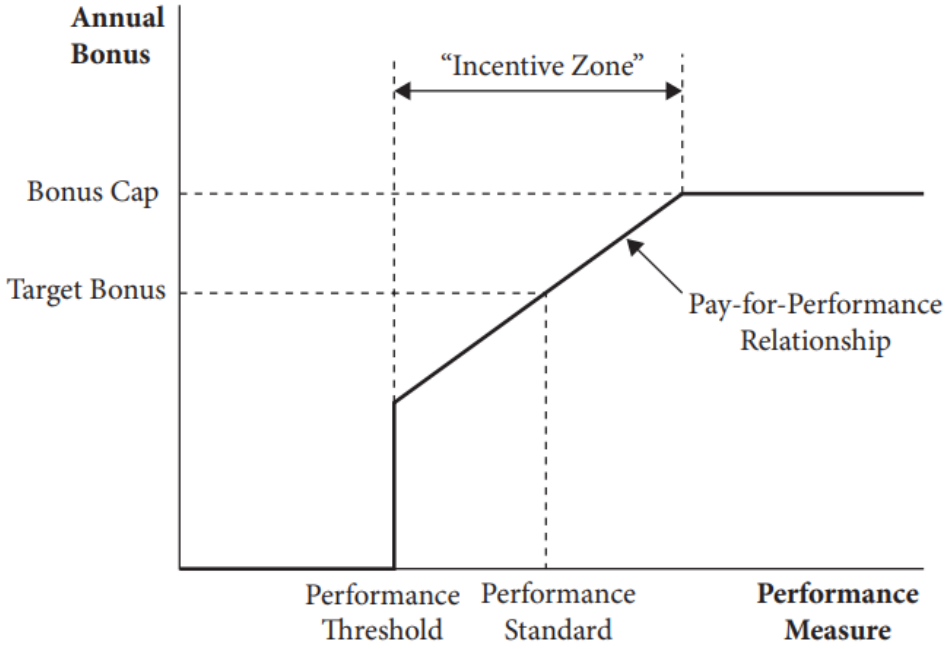
- The better and more established the culture of variable compensation in an industry or a company, the sooner managers will accept higher variable compensation shares.

Concerning the time aspect, the variable part of compensation plans can be both short-term and long-term.

Executive remuneration is largely delivered through variable pay, which means that a substantial part of the remuneration is at risk and depends on positive performance. Both short-term incentive plans (STIP or STI) and long-term incentive plans (LTIP or LTI) are commonplace at listed companies, whereby more emphasis is usually put on the long-term component. STIPs are typically paid in cash and are based on the results of the previous business year, and they typically range from 50% to 200% of salary (Mercer, 2009, p.12). Other names for this are the annual incentive plan (AIP) and non-equity incentive plan (NEIP).

Fig. 6 shows that an annual bonus is paid if a performance threshold is achieved (usually 50 to 75% of target, where the target is usually 100% of the salary) and is mostly capped at 200% of the salary (Kolb, 2012, p. 49):

Figure 6 Typical Annual Bonus Plan



Source: Kolb, 2012, p. 49

STIPs are mainly target incentives requiring KPIs to be met. Financial performance measures are for example revenues, net income, pre-tax income, operating profit (EBIT), economic value added (EVA), earnings per share (EPS), and return targets like Return on Assets (ROA), Return on Equity (ROE), and Return on Investment (ROI). Non-financial indicators are, for example, customer satisfaction, operational and/or strategic objectives, and HSE (health, safety, environment) measures (Murphy 1999, p. 2500).

There are also discretionary bonuses that are unexpected awards for past performance. These are not part of a pre-agreed target incentive plan and are paid, for instance, for a successful project or an excellent safety record (Graham, 2008, p. 266).

Long-term incentive plans are similar in structure to annual bonus plans but are not based on a one-year performance but on a multi-year performance, generally over 3- or 5-year periods. Payoffs are usually paid in equity and less frequently in cash (Kolb, 2012, pp. 15–16). LTIPs are generally the largest part of executive pay and are designed to accomplish the goals of aligning executive interests with

the interests of shareholders, to attract, motivate, and retain top people, to promote long-term thinking, to share the company's success with the executive, and to enable the executive to accumulate wealth (Graham, 2008, p. 333).

The main long-term incentives are (Lipman & Hall, 2008, p. 113):

1. Stock Options (incentive stock options or non-qualified stock options),
2. Stock Appreciation Rights, payable in stock or cash,
3. Performance share plans, payable in stock or cash,
4. Restricted Stock Bonus and Award Plans,
5. Phantom Stock Plans payable in stock or cash.

Stock options are call options on the shares of the company and grant the executive the right to buy shares at the strike price or exercise price (price on the date of grant) during a specified period; that right lasts until the expiration of the option (Kolb, 2012, p.17). So long as the options are "in the money" there is a significant incentive and retention value but if the options are "under water" (current stock price is below exercise price) the retention value disappears quickly (Halloran, 2004, pp. 211–212). Options are non-target-oriented plans, and they have a vesting requirement with the expiration period mostly amounting to 10 years. As vesting usually happens after 3 to 5 years, the options need to be exercised from vesting until expiration, as they are otherwise forfeited. If the executive leaves the firm before vesting, the options get forfeited too (Kolb, 2012, pp.18–19). An incentive stock option allows the executive to achieve long-term capital gains on the appreciation of the stock after the grant date provided the executive does not sell the shares for 2 years after the option grant and for 1 year after the exercise date, and the option holder is employed at the company from the grant date until 3 months prior to the exercise of the option. A non-qualified stock option requires the executive to pay ordinary tax on the difference between the grant price and the exercise price of the option (Lipman & Hall, 2008, pp. 122–124).

Stock appreciation rights (SAR) are similar to options, which means that they only have value if the stock price exceeds the exercise price. Whereas with stock options the executive must pay cash in exchange for stock, with SARs the company

pays the executive the difference between the current market price and the exercise price in cash and/or shares for the number of SARs held. SARs are often granted together with stock options, which gives the executive the option to receive cash or shares by exercising one or the other (Balsam, 2002, pp.133–134).

Restricted stock grants entail that the firm awards shares to the executive, although the shares have some restrictions that mostly require a vesting period. After such a period, the executive can sell these shares (Kolb, 2012, p. 53).

Performance shares link the award of shares to the attainment of pre-agreed targets. Performance can be measured using internal financial, operational, and other objectives, stock prices, or some combination of these. EPS, ROE, and TSR are frequently used targets (Ellig, 2007, p. 489).

A phantom stock plan is a notional plan that creates an equity equivalent award for the executive, and a bookkeeping account is usually held for each award. Such an award is subject to vesting conditions (often the continuation of the employment of the executive for a specific period) and may be settled in stock and/or cash (Lipman & Hall, 2008, p. 121).

Table 4 shows the main components of an LTIP and the requirements for grants (Lipman & Hall, 2008, pp. 115–116):

Table 4 Long-term Compensation Components

Incentive Stock Options	Nonqualified Stock Option Plans	Stock Appreciation Rights	Performance Share/ Unit Plans	Restricted Stock Plans	Phantom Stock Plans
Description					
A right granted by employer to an employee to purchase stock at a stipulated price during a specified period of time in accord with Section 422 of Internal Revenue Code.	A right granted by employer to purchase stock at stipulated price over a specific period of time.	A right granted to employee to realize appreciation in value of specified number of shares of stock. No employee investment required. Time of exercise of rights is at employee's discretion.	Awards of contingent shares or units are granted at beginning of specified period. Awards are earned out during the period that certain specified company performance goals are attained. Price of company stock at end of performance period (or other valuation criteria) determines value of payout.	Shares of stock are subject to restrictions on transferability with a substantial risk of forfeiture, and shares are granted to employee without cost (or at a bargain price).	Employee is awarded units (not any ownership interest) corresponding in number and value to a specified number of shares of stock.
Characteristics					
• Option price is not less than fair market value on date of grant.	• May be granted at price below fair market value.*	• May be granted alone or in conjunction with stock options.	• Awards earned are directly related to achievement during performance period.	• Shares become available to employee as restrictions lapse-generally upon completion of a period of continuous employment.	• Award may be equal to value of shares of phantom stock or just the appreciation portion.

Incentive Stock Options	Nonqualified Stock Option Plans	Stock Appreciation Rights	Performance Share/ Unit Plans	Restricted Stock Plans	Phantom Stock Plans
• Option must be granted within ten years of adoption or shareholder approval, whichever is earlier, and granted options must be exercised within ten years of grant. • $100,000 limitation on total amount that first becomes exercisable in a given year (measured on date of grant). • Previously acquired stock may be used as payment medium for the exercise of incentive stock options.	• Option period is typically ten years. • Vesting restrictions are typical. • Previously acquired company stock may be used as full or partial payment for the exercise of nonqualified stock options. • May be granted to non-employees.	• A specified maximum value may be placed on amount of appreciation that may be received. • Distribution may be made in cash or stock or both in amount equal to the growth in value of the underlying stock. • May be granted to non-employees.	• Performance periods are typically from three to five years. • Grants usually are made every one to two years as continuing incentive device. • Payments are made in cash or stock or combination. • May be granted to non-employees.	• Individual has contingent ownership until restrictions lapse. • Dividends can be paid or credited to the employee's account. • May be granted to non-employees.	• Dividend equivalents may be credited to account or paid currently. • Benefit can be paid in cash or stock or both. • May be granted to non-employees.

Source: Lipman & Hall, 2008, pp. 115–116

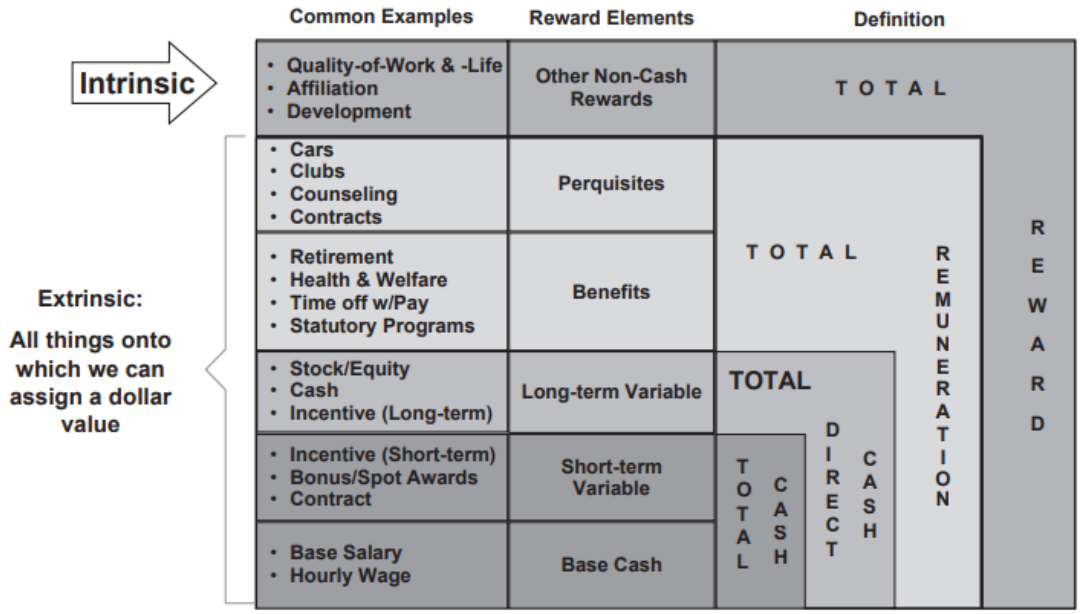
Other pay components include benefits and perquisites whose value must also be reported in the proxy statement respectively management information circular. Such items are, for instance, company cars, the use of corporate aircraft, special dining facilities, club memberships, health, dental, life, and disability insurance, and the ability to defer compensation at above-market rates of interest (World at Work, 2007, p. 296).

Severance payments arise when an executive leaves the firm under pressure or gets fired without cause. Change of Control payments happen when the firm is acquired by another company and provides some insurance should the executive lose their job as a consequence of an acquisition or a merger, which happens quite frequently (World at Work, 2007, pp. 296–297).

Finally, most companies offer pension plans in the form of deferred compensation. When executives retire from the company, they receive a payment or a series of payments, whereby such payments mainly depend on the number of years the executive worked for the company and the earnings they had while working (World at Work, 2007, pp. 295–296).

Fig. 7 shows all elements of total remuneration (as the extrinsic part) and the total reward (including the intrinsic part) as a total benefit for executive services (Graham et al., 2008, p. 224):

Figure 7 Executive total rewards



Source : Graham et al., 2008, p. 224

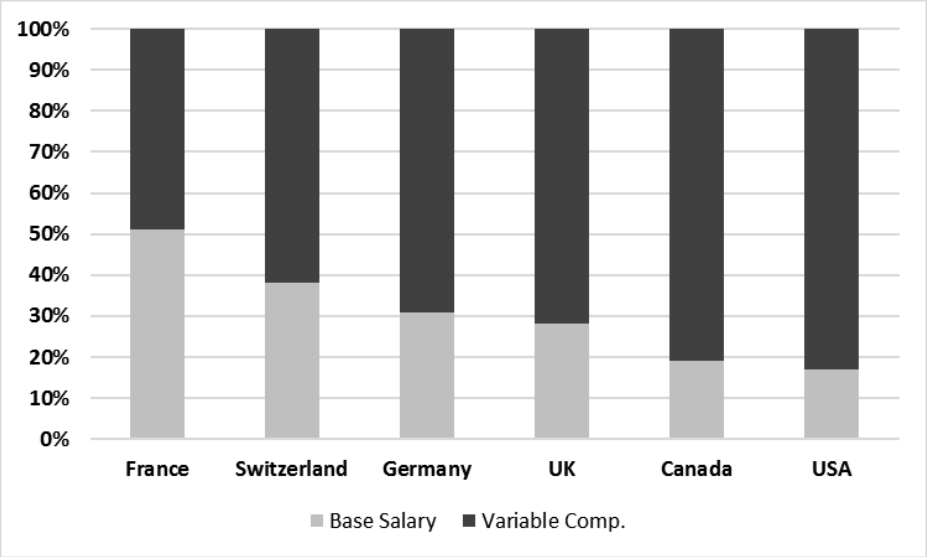
2.3.2 Empirical Findings: Management Compensation and Firm Performance

One of the most recent studies on the pay-performance topic found—based on an extensive literature review—contradictory findings in prior research, which can be grouped into three categories: research finding negative, positive, or non-significant effects regarding executive pay and firm performance (Eklund, 2019, pp. 40–42). Furthermore, Eklund (2019, p. 41) showed a general geographic selection bias as most studies focus on Anglo-Saxon countries.

Eklund (2019, p. 47) examined the top-20 companies based on market capitalization in six countries and showed that the share of variable compensation (median) in total compensation is highest in the US with 83% and lowest in France with 49% (2017; see also Fig. 8). This means that, in the US, the base salary share is the lowest of the examined countries with 17%, followed by Canada with 19%, while in France the base salary share of total compensation amounts to 51%. For the sake of comparison, the amount of variable compensation (Bonus,

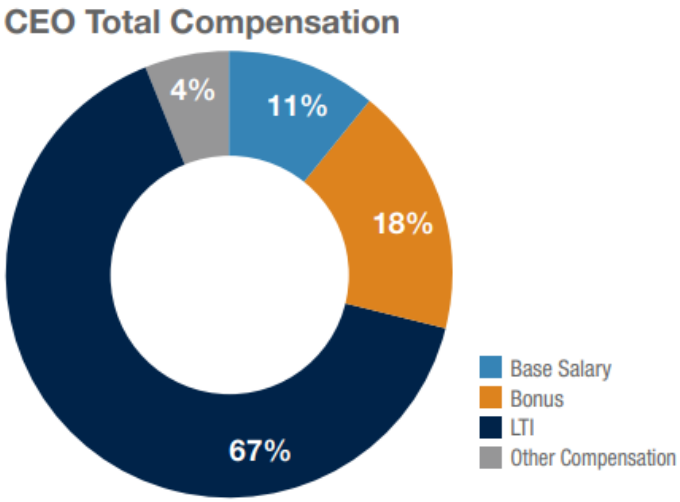
LTI) among the 100 largest US E&P companies in 2017 was 85%, as shown in Fig. 9 (Alvarez & Marsal, 2018, p. 5).

Figure 8 Share of Base Salary and Variable Compensation (median) in Top-20 Companies in different Countries (in %; 2017)



Source: Author's presentation based on data from Eklund (2019, p. 47)

Figure 9 Share of fixed and variable compensation of 100 largest US E&P companies in 2017



Source: Alvarez & Marsal (2018, p. 5)

Consequently, it can be stated that, in the case of Canada, the US, and the United Kingdom (UK), Anglo-Saxon countries show the largest share of performance-based compensation, which may also explain the general research focus on these countries. Of all countries, CEOs in the US generally get the highest total compensation, largely through high variable components (Kolb, 2012, pp. 10–11).

This becomes especially clear when comparing the development of the fixed salary, the change of the income generated by variable components, and the percentage of value-based compensation in the variable component (Kolb, 2012, pp. 15, 20) and gives rise to the assumption that the actual compensation scheme mirrors a shift in the principal-agent power balance, thereby indicating that the managerial power has increased to the shareholders' disadvantage, and rejecting the assumption that the incentive theory leads to optimal contracting (Kolb, 2012, pp. 36–39).

As most of the research focuses on the Anglo-American sphere, the results should not be generally applied to other jurisdictions without adjustments or revision.

The following literature review aims at achieving four targets in the discussion of prior empirical research: (1) focusing mainly on Anglo-Saxon markets, (2) considering the possibility of a time selection bias in the discussion of research results, (3) focusing on the discussion of research results published in higher-ranked academic journals and (4) attempting to search for an overarching trend in the changes of management compensation and firm performance features.

2.3.2.1 Pre-2008 Crisis Empirical Research

Basically, it is assumed that, if agents receive payments for a specific desirable behavior, it is likely that they would engage in the desired behavior. However, Deci and Ryan (1985, pp. 44–45) found that monetary incentives only stimulate intrinsic motivation to a certain (and mostly low) degree. Frey and Jegen (2001, p. 591) argued that monetary incentives can crowd out motivation to undertake activities, which contradicts the expected relative price effect on which economics is largely based. However, there are also many situations where monetary incentives do increase intrinsic motivation. Stone and Ziebart (1995, p. 259) found that "*in contradiction to arguments made by some economists*, *very high incentives may potentially decrease (not increase) decision quality by increasing negative affect*" and, thus, the performance of agents. The same effect can be observed in the opposite case, which Fehr and Schmidt (1999) call inequity inversion: *"Inequity inversion means that people resist inequitable outcomes, i.e., they are willing to give up some material payoff to move in the direction of more equitable outcomes"* (Fehr & Schmidt, 1999, p. 819). This entails that the effect of incentives is not positive and linear, which would imply that the higher the incentive, the higher the output.

Bebchuk & Fried (2004, p. 12) asserted that high-powered incentives are only a partial solution for agency issues.

Boivie et al. (2011, pp. 551–552) studied 2,000 large, listed US companies in 2004 and 2005 and found that a high identification of CEOs with the organization increases intrinsic motivation and reduces agency costs. However, this does not necessarily mean that their performance is improved.

The empirical research on the link between compensation plans and corporate performance can be divided into two groups:

(1) A compensation plan either leads to outperformance or the desired performance improvement. Outperformance is meant to be substantial revenue growth, profit growth, profitability, or yield increase. The desired performance is an increase of an indicator, which is defined by the compensation plan of the company.

(2) There is no measurable effect between a compensation plan and company performance. Other corporate governance control mechanisms or other exogenous effects dominate.

Earlier studies, until about 2000, were based almost exclusively on the examination of US companies' data:

- Brickley et al. (1985) found that the introduction of long-term performance plans is well received by the markets but does not lead to a performance difference for different types of compensation plans. Their sample consisted of 344 US companies including time-series data for various variables in the period from 1979 to 1982. The analysis indicated that no particular type of long-term plan increases shareholder value more than others.

- Jensen & Murphy (1990) completed a detailed analysis of information on salaries and bonuses for 2,505 CEOs in 1,400 publicly held companies from 1974 to 1988. They concluded that the main issue is not how much CEOs were paid but how they were paid and emphasized the importance of variable parts of pay so that CEOs should be shareholders and hence their wealth should be linked to the wealth of the shareholders. Executives should thus receive high pay if they deliver on targets and achieve a solid long-term performance of the company and there should also be the threat of dismissal in the case of poor performance.

- Wallace (1997) examined 40 US companies with compensation plans based on residual income (earnings before interest less a capital charge on total capital) and 40 control companies where incentive compensation was based on accounting earnings such as earnings per share and operating profits for the period from 1986 to 1994. The result was that schemes

based on residual income decreased new investments and increased dispositions of assets, increased payouts to shareholders by share repurchases, and better-utilized assets. This is consistent with the Rate of Return discipline linked to the capital charge in residual income-based indicators and is also in line with executives reducing agency conflicts of free cash flow.

- Vafeas (2000) examined the performance impact of 112 US public firms adopting outside director incentive plans between 1989 and 1995. The intent was to align the interests of shareholders with the interests of their agent-directors. The study did not discover any significant performance differences compared to 112 control companies not making such plans, whereby the possible reasons given for this are that: (1) Companies use company-specific control mechanisms to minimize agency costs. The introduction of incentive plans for outside directors is, therefore, intended to cover deficits in the set of their control mechanisms. (2) The financial incentives emanating from the incentive mechanisms are too weak to be effective. (3) The cost of the compensation plan essentially corresponds to the benefit generated by the incentive effect. (4) The advantages of the incentive mechanism have not yet been established during the investigation phase. (5) It is not the mere introduction of an incentive plan that is relevant for the analysis but its precise structure (incentive and control effect of the directors regarding the management in situations such as company takeovers, CEO compensation, and appointment). The study has shown that – unconditionally – the adoption of director incentive plans had little or no impact on firm performance.

- Brooks et al. (2001) examined the long-run performance of firms before and after the adoption of accounting-based compensation plans. A total of 175 US firms were investigated during the period from 1971 to 1980 and the findings show that, on the one hand, such plans signal an improved future performance to the market (signaling information) and thus increase stock prices. On the other hand, the plan aligns the interests of sharehold-

ers with those of managers (incentive alignment explanation). Both explanations indicate an improvement in performance for adopters of such plans versus non-adopters.

- Hogan & Robinson (1995) found mixed results in the electric utility industry. They analyzed 32 US firms whose 1991 and 1992 CEO compensation data were available, whereby only salaries and annual bonuses were used in regard to pay packages. The results were that compensation was shown to be related to multiple-year changes in the financial performance of companies. It was not found, however, that CEOs are rewarded for maximizing returns for shareholders and for increasing the sales growth.
- Akhigbe et al. (1995) investigated 350 US companies for the period from 1987 to 1991 and found a statistically insignificant relationship between firm performance and CEO compensation. Their research also offers little support for the view that CEO pay reduces agency costs and enhances firm value.
- Lambert et al. (1991) analyzed 303 large publicly traded US companies operating in a variety of manufacturing and service industries based on data from 1982 to 1984. They not only covered the CEOs but also several hierarchical layers below and the main topic was whether compensation correlates with firm size. Their research concluded that rather than investigating the absolute levels of compensation and firm size, the yearly percentage changes (relative figures) should be used. Under such an assumption, the changes in size and compensation did not exhibit a high correlation.
- Hubbard & Palia (1995) investigated 147 US banks during the 1980s and found higher levels of CEO pay and a higher linkage between compensation and performance where interstate banking (banks allowed to operate in other states) is permitted. The CEO turnover increased substantially after the deregulation of interstate banking. The evidence also indicated that the size of the bank is positively related to compensation.

- Smith & Watts (1992) used extensive US industry-level data from 1965 to 1985 and found that firms with more growth options such as greater access to positive NPV projects have lower leverage, lower dividend yields, higher executive pay, and greater use of stock-option and bonus plans. In contrast, regulated firms have higher leverage, higher dividend yields, lower CEO compensation, and less use of stock options and bonuses.
- Joyce (2001) analyzed 687 financial institutions in the 1990s and found a small but positive relationship between company performance measured by ROA and CEO pay. He used salary plus bonus (total cash compensation) for defining pay, thereby omitting long-term components.
- Arya & Sun (2004) investigated effects on CEO compensation before and after deregulatory legislation in the US electric utility industry in response to the Energy Policy Act of 1992. They found a significant increase in CEO compensation after the deregulation in parallel to a shift from salary to long-term incentive payments and bonuses. The results confirmed the hypothesis that deregulation leads to an increase in total pay and a shift towards performance-driven compensation components.
- Grace (2004) examined the structure and level of compensation for 103 property-liability CEOs from 1995 till 1997. She found that an increase in regulatory attention leads to a decreased use of incentives, and that firm risk and size are positively linked to the structure of compensation packages, whereby individual elements of incentives provide CEOs with differing incentives and the total level of compensation substantially increases with firm performance. Consistent with other studies, this research found a small but positive association between ROA and total CEO compensation but found little evidence for a relationship between insurer investment opportunities and incentive compensation.
- Nourayi & Daroca (2008, p. 563) ascertained an increase in pay-for-performance research but concluded in their literature review that previous research only found a small but nevertheless significant relationship between compensation and performance. They examined the relationship

between CEO total compensation and cash compensation as the dependent variables and revenue (as firm size proxy), accounting returns, market returns, and employee growth as the explanatory variables. They identified the firm size and a market-based indicator (shareholder return) and an accounting-based indicator (ROA) as significant explanatory variables (Nourayi and Daroca, 2008, p. 581). This result is not very surprising because it is obvious that larger firms pay higher compensations. By contrast, ROE as the performance variable on the firm-level only showed a weak relationship with the cash compensation and total compensation and the effect of both compensation elements on the TSR is also comparably small (Nourayi & Daroca, 2008, p. 568).

The analysis of remuneration schemes in the largest two-tier system country—Germany—shows a significantly different picture compared with the US. The differences are a result of the shareholder-oriented Common Law governance in the US and the stakeholder-oriented Code Law system in Germany. For example, Tuschke (2003, pp. 62–66) noted that the use of performance-related remuneration components in Germany is much less pronounced. Compared to the US, German executives receive relatively little performance-based pay as in Germany a large portion of the total pay is fixed and mainly dependent on firm size and sales. This fact is justified by the different corporate governance traditions of these countries and in Germany, various other control mechanisms—such as the supervisory board—have great importance (Frederikslust et al., 2008, p. 648). Another reason for the lack of comparability is the high concentration of shareholdings in Germany. It is assumed that individual anchor shareholders (including banks as shareholders) usually perform their control function very efficiently so that the need to introduce comprehensive incentive systems is lower. The greater the ownership concentration, the less able executives are to extract excessively high pay. Like in the US, good performance and company size are positively correlated (Elston & Goldberg, 2003, p. 1407).

Concerning the critical assessment of research on incentive-based compensation effects, it must be stated that, from a scientific and from the agency theory perspective, the heterogeneous results are unsatisfactory (Tosi et al., 1997, pp. 584–586; Tosi et al., 2000, p. 305). If the intended incentive effects are not

achieved by the respective remuneration instruments, the corresponding desired consequences are also not demonstrable. Even the question of whether remuneration is to be considered as a dependent or independent variable is a relevant issue (Bültel, 2011, p. 98). There is also discussion as to whether increased company performance has a positive effect on the remuneration or whether compensation schemes increase the top management's motivation resulting in a positive effect on firm performance (Kettenring, 2012, p. 54).

In conclusion, the inconsistent findings of the results from the research on incentive-based compensation should not be construed as a refutation of theoretical approaches per se (Gomez-Mejia et al., 2005, pp. 1509–1510). Instead, the identification of various methodological problems implies the need for improved propositions to tackle this research problem. Indeed, there is increasing professionalism concerning remuneration policies and the corresponding development of better remuneration instruments.

2.3.2.2 Post-2008 Crisis Empirical Research

The 2008 financial crisis exemplified the concerns that executives were over-incentivized to take risks with assets owned by shareholders. Therefore, a better design of compensation policies and plans was regarded as an important means to rein in executive pay and particularly incentives that led to excessive risk-taking.

Yang et al. (2019) examined 225 Canadian companies listed on the Toronto Stock Exchange (TSX) using 2014 fiscal year data. They found significant but very weak relationships between long-term incentive plans (total vested value) and firm performance in terms of ROA, ROE, and TSR (r^2 = 0.02-0.03). Only firm size (revenue) showed a higher explanatory power with r^2 values ranging from 0.27 for total payment and 0.47 for total outstanding options and share-based awards (Yang et al., 2019, p. 10). However, these relationships were examined with compensation variables as dependent variables. Thus, the study explains that firm size enables the firm to pay higher amounts in total payments and to grant higher amounts of options and share awards, which does not imply firm performance effects but an advantage in the CEO labor market.

Bussin (2018) examined 30 South African mining companies listed on the Johannesburg Stock Exchange (JSE) over the 5-year period from 2009 to 2013 and focused on the effect of fixed pay and short-term incentive payment on firm performance indicators (ROE, ROA, asset turnover, revenue, EBITDA, EPS, and change in share price and market capitalization). He found that CEO pay is positively linked with firm performance, as each of the compensation components showed a moderate to strong positive association with most of the performance measures. As to the fixed element (salary), there is a positive relationship with ROA, market capitalization, revenues, and EBITDA (Bussin, 2018, p.10), while the STIP is strongly correlated with market capitalization and EBITDA. The study also showed that firm size plays a key role in defining the size of compensation (Bussin, 2018, p. 11).

The study justifies its emphasis on short-term incentives by referring to prior empirical research which mainly focused on the positive effects of long-term incentives on firm performance. Yet, Bussin (2018, p. 11) stated that prior research on mining and resource companies did not find a positive effect of long-term incentives on firm performance, thereby warranting a closer look at the effects of short-term incentive payment. A study by Deloitte analyzed the pay versus performance of the 100 largest companies listed on the JSE. Regarding mining, construction, and resources companies they found that the total annual compensation of CEOs has grown by 192% while shareholder value only increased by 75% during the period from 2010 to 2017 (Deloitte, 2018, p. 14). Bussin (2018, pp. 11–12) concluded that the main issue in the pay-for-performance concept is to find proper performance indicators in the incentive plan design, particularly in the sense of fitting with the specific industry requirements of the company and firm-specific challenges and resources.

Concerning Europe, Switzerland is one of the few countries with a one-tier system. In her dissertation, Eklund (2015) investigated the CEO compensation link of 210 Swiss firms from 2007 to 2013 to firm financial performance, risk, and peer group comparisons. She used EPS and ROA as accounting indicators and TSR and Tobin Q (market capitalization/book value of assets) as market indicators. Concerning variable pay, she found a negative association with ROA, which she highlighted as an agency conflict. The other indicators EPS, Tobin Q, and TSR

did not yield significant results. For the total CEO compensation, all accounting and market KPIs had no significant linkage. She, therefore, concluded that the pay and performance link in Swiss listed firms is decoupled (Eklund, 2015, p. 204). Eklund (2015, p. 212) recommends also including non-financial performance indicators such as client and employee satisfaction, reputation, and loyalty in compensation contracts.

This short overview of post-crisis empirical research gives the impression that, compared to pre-crisis research, the use of performance indicators has diversified.

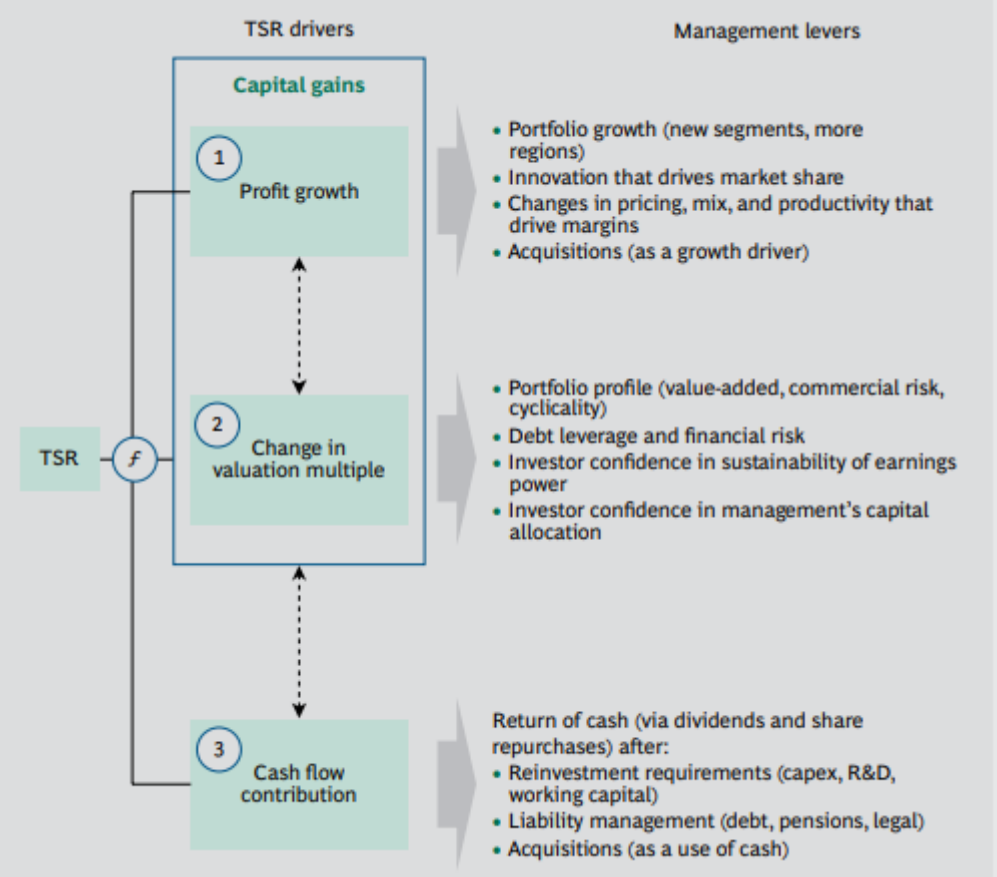
Shareholders' involvement reached high levels, and this exerted substantial pressure on companies to maximize shareholders' wealth. Confronted with such pressure, companies tried to tie managers' compensation schemes to the change in shareholders' wealth (Makhija & Trivedi, 2020, p. 1). To promote this target, the concept of value-based management (VBM) was an appropriate tool to update and broaden the pay-for-performance concept (Kaufmann, 2020, pp. 30–31).

The VBM assumes that shareholder returns will increase if management adopts a value-based management approach. To manage a company in a way that meets the short- and long-term expectations of investors, the factors that have the greatest influence on the share price increase need to be clearly identified and consistently applied as a basis for management control, both in internal decision-making and in communication with shareholders (Milano et al., 2016, pp. 48–49; also see Fig. 10).

The system of performance drivers of the VBM is the decision-supporting instrument for the evaluation of individual projects and investments from the perspective of shareholder value and for the synchronization of operative management activities and investment decisions to increase the company's economic value. Accordingly, VBM is a management approach that combines data analysis techniques and management processes of a company to align management decisions with the most important value drivers (Weber et al., 2017, pp. 16–20).

The objective of the value-based management is to close the value gap, which is the gap between the current market value and the intrinsic value that is not included in the investors' valuation of the company (Ruhwedel & Schultze, 2002, p. 606).

Figure 10 TSR Drivers in the Value-Based Management Approach



Source: Boston Consulting Group 2013, p. 7

The VBM's criticism is directed toward traditional performance measures such as ROI, ROE, and EPS, as these measures consider the cost of capital but not the time value of money. Furthermore, the basis for the calculation of these ratios is the inclusion of the profit (income or earnings), which is not necessarily related to the increase in the share price. As a result, organizations that use the traditional business management tools of performance measurement have difficulty in increasing shareholder value (Rappaport, 1986, pp. 14–24).

The VBM approach considers the interests of shareholders as a priority by defining the company value as the most important goal of corporate management. Management should be measured in a way that is consistent with the way the capital markets assess the firms (Young & O'Byrne, 2001, pp. 28–29).

The shareholder value concept assumes that shareholders invest in those shares that promise the highest returns under a certain risk-reward ratio (Mikołajek-Gocejna, 2014, pp. 135–139). Profit growth, a change in valuation multiple, and free cash flow distribution are important drivers of the TSR as one of the top metrics of the VBM (see Fig. 10). The TSR is used to measure stock returns as the sum of price gains or losses and the return on invested capital in the form of dividend payments for a defined period (Pandaya, 2014, p. 31):

$$TSR = \frac{SharePrice(PeriodEnd) - SharePrice(PeriodBegin) + Dividend}{SharePrice(PeriodBegin)}$$

Recent research on the determinants of the TSR shows that market-based and accounting-based indicators provide good results concerning TSR prediction (see Table 5).

Table 5 Recent Empirical Research on Accounting-, Market-, and Value-Based Measures as TSR Predictors

Research Objective/Sample	*Main Method of Data Analysis*	*Essential Results*
	Fayed & Dubey (2016)	
Accounting-based, market-based, and value-based performance indicators as TSR predictors (43 UAE top-index listed companies; 2008–2013)	Pooled Regression	The most significant predictor is price/book ratio as the market-based indicator and net book value/total assets as the accounting-based indicator, whereby value-based indicators do not provide significant information.
	Wolf & Hoffman (2017)	
Accounting-based and value-based indicators as share price predictors (30 largest LSE listed companies; 2011–2015)	Pooled Regression	Price Earnings Ratio, Value added and Value per share have the highest explanatory power for the share price.
	Lueg et al. (2019)	
Explorative study including accounting-based and banking-specific performance indicators (132 listed retail banks with a market cap larger than 500 million USD, headquartered in EU, US, and CAN; 2001–2011)	Fixed effects two-stage OLS regression (pooled data)	Significant accounting-based indicators: ROA, revenue growth, and conservative loan loss coverage.

Research Objective/Sample	*Main Method of Data Analysis*	*Essential Results*
	Makhija & Trivedi (2020)	
Value-based and accounting-based performance indicators (56 Indian top-index listed companies; 2012–2019)	Pooled Regression	Accounting-based ratios are better TSR predictors than value-based ratios; significant predictors: ROE (r^2 = 0.17, ROCE (r^2 = 0.02), ROA (r^2 = 0.03), EVA (r^2 =0.004).

Source: Author's presentation; UAE = United Arab Emirates, LSE = London Stock Exchange

Reda (2018) examined the incentive plan design of US top-200 mid-cap companies for the reporting years from 2014 to 2017. The study showed that all three classes of performance measures—accounting-based measures, market-based measures, and value-based measures—are used in the context of pay-for-performance systems. He found that the investigated companies, showing a market capitalization of USD 500m to 5bn, have changed their incentive plan design substantially in the last few years. The LTI award mix shows an increase in the share of performance-based awards from 39% (2014) to 51% (2017) and a decrease of both the share of appreciation awards (stock options and stock appreciation rights) from 26% in 2014 to 17% in 2017 and of the share of restricted stock from 35% in 2014 to 32% in 2017 (Reda, 2018, p. 38). Reda mentioned that all three LTI award types have increased in prevalence during the observation period (Reda, 2018, p. 39, see Table 6), which can clearly be recognized in the average number of award types granted per company rising from 1.82 in 2014 to 1.94 in 2017. The share of companies applying two performance indicators to determine the LTI payment has not changed much with 49% in 2014 and 46% in 2017. There was, however, a significant increase in the share of companies determining the LTI by three indicators from 16% in 2014 to 28% in 2017 (Reda, 2018, p. 40).

Table 6 LTI Award Types in US Mid-Caps 2014–2017

LTI Award Type	*Specification*
Appreciation Awards	– Stock Options – Stock Appreciation Rights
Restricted Stock/Units Awards (Time-Based Vesting)	– Mid-term-based (3 to 5 years) – Long-term-based (more than 5 years vesting period)
Performance-Based Awards	– Performance Shares/Units – Performance-Restricted Stocks/Units with Performance Hurdles – Performance/Premium Stock Options – Long-Term Cash

Source: Author's presentation based on Reda (2018, p. 39). LTI = Long-Term Incentive

Income-related measures remain the most prevalent performance measure, with 59% of the companies using income growth as an indicator to determine the long-term incentive payment and 92% to define the short-term incentive payment (Reda, 2018, p. 41; see Table 7).

Table 7 STI and LTI Performance Measures of US Mid-Caps (Total Sample, 2017)

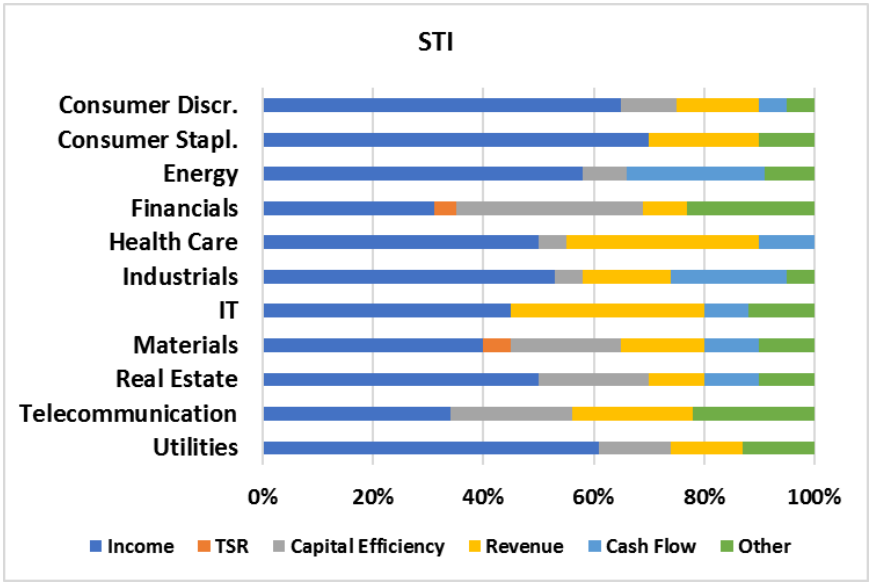
Short-Term Incentive Plan (STI) Performance Measures		*Long-Term Incentive Plan (LTI) Performance Measures*	
Measure	Share of Companies	Measure	Share of Companies
Income	92%	Income	59%
Capital Efficiency	24%	TSR	55%
Revenue	34%	Capital Efficiency	23%
Cash Flow	16%	Revenue	20%
TSR	2%	Cash Flow	8%

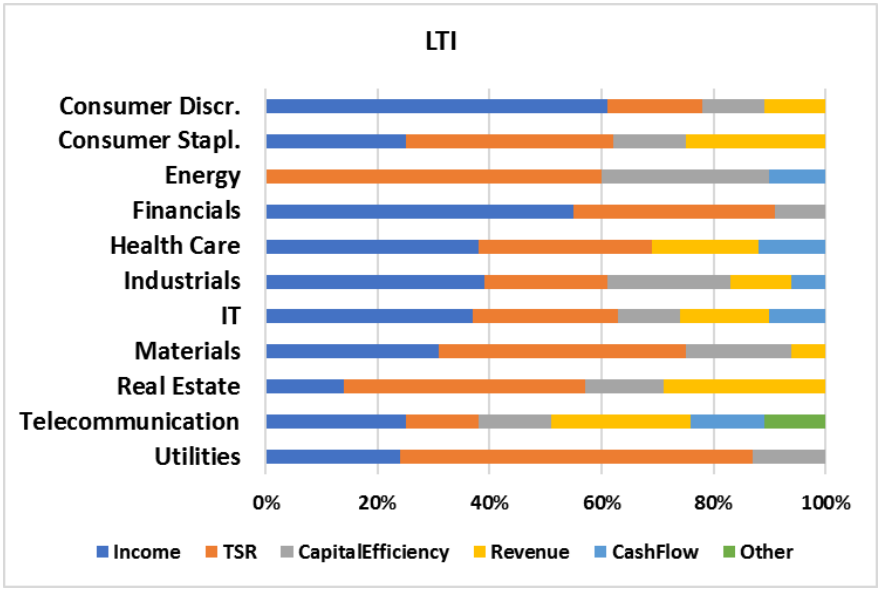
Source: Author's presentation based on data by Reda (2018, p. 41). Note: Because most firms have multiple measures, the percentage figures sum exceeds 100%. The capital efficiency measures are ROA, RONA, ROCE, ROE, ROI, and ROIC.

Concerning the most prevalent performance measures, Reda (2018, p. 41) found that income metrics are prevalent in STI and LTI, whereas the TSR prevails in the long-term incentive design. The LTI key financial performance indicators among the US top 200 mid-caps show considerable differences regarding the sector.

In contrast to all other sectors, the energy sector does not use income as LTI. Instead, companies in the energy sector use the TSR as the main LTI followed by Capital Efficiency. No company in this sector has income as LTI, which distinguishes it from all other sectors. As to the STI, income is the dominant KPI for the energy sector followed by the cash flow (see Fig. 11).

Figure 11 STI and LTI Key Performance Measures of US Mid-Caps (by Sector in %; 2017)





Source: Author's presentation based on data from Reda (2018, pp. 41, 43). Note: STI = short-term performance indicator; LTI = long-term performance indicator

A multitude of factors is examined in recent research, which not only examines accounting-based performance and value-based performance but also factors such as CEO power, firm size, board structure, and other variables by analyzing samples of listed companies (see Table 8).

Table 8 Accounting-Based Indicators, Value-Based Indicators, and other factors in the Pay-for-Performance Research

Research Objective/Sample	*Main Data Analysis Method*	*Essential Results*
Sun et al. (2013)		
Effect of several performance indicators (ROA, revenue growth, stock return, volatility, industry-specific cost-efficiency metric) on CEO compensation components (31 listed US P&L insurance companies; 2000–2006)	Panel Regression	Revenue efficiency (RE) and cost efficiency (CE) measures are positively and significantly linked to CEO total compensation. RE is more important for defining cash compensation and CE is more prevalent in incentive compensation. Recommendation: Productive efficiency should also be included in management compensation schemes, especially for firms concerned with long-term growth.
Balafas & Florackis (2014)		
Ex-post consequences of CEO cash-based and incentive-/equity-based components for shareholder value (UK listed companies; 1998–2010; 69 < N < 1,166 – number of companies differs by year)	Pooled OLS Regression	A strong negative relationship exists between CEO incentive pay and future shareholder returns. Firms in the lowest incentive pay decile earn good returns, whereas firms in the highest incentive pay decile produce lower and statistically insignificant returns. CEO incentive pay is also negatively linked to future operating performance.
Müller (2014)		
Effect of board (non-executives) compensation characteristics (components) and industry class on contemporaneous and next year's firm performance measured by ROA (LSE FTSE100 companies, 2010–2011)	Multiple Regression	Statistically significant relationship between basic fee, fees paid in shares, and additional remuneration for committee membership and firm performance. Chair remuneration and senior non-executive remuneration have no significant influence on firm performance.

Pham et al. (2016)		
CEO compensation and stock returns (431 ASX companies, 2001–2012)	Pooled OLS Regression	Incentive pay is positively associated with future stock returns; higher incentive pay induces CEOs to engage more in R&D; the impact of incentive pay on stock returns is stronger in firms led by younger CEOs. The study concludes: "*Our findings of a positive relation between incentive pay and stock returns lends support to using equity-based compensation as an effective component to align the interests of managers and those of shareholders.*" (Pham et al., 2016, p. 35)
Yarram & Rice (2017)		
Comparison of the effects of several governance characteristics and firm characteristics on CEO compensation in total and on diverse compensation components among non-mining companies and mining companies (129 ASX-listed Australian mining companies, 332 ASX non-mining companies; 2005–2013)	Random Effect Panel Regression	Pay-performance sensitivities are higher for mining firms compared to non-mining firms. Mining firms are more geared toward long-term incentives while non-mining companies are more focused on short-term incentives. Due to the cyclicality in prices for minerals, CEOs negotiate aggressively for incentive-based pays to benefit from upsides in the firm's earnings. This increases their risk tolerance and leads to investment decisions exposing firms to higher risk and higher potential returns. The study results do not provide evidence in favor of managerial power in the investigated firms.

Yang et al. (2019)		
Determinants of CEO compensation components (225 firms on S&P 500/TSX Composite Index, 2014)	Multiple Regression	Firm size (in terms of annual revenue) has strong effects on CEO cash compensation, equity compensation, and total compensation; firm performance measures such as ROA, ROE, TSR, and shareholder value have little effects on CEO cash compensation, however, there is a strong linkage between firm performance and LTI vested value, outstanding LTI and total direct compensation (TDC) vested value.
Shim & Malik (2019)		
Economic determinants of the CEO compensation in the pre- and post-financial crisis periods (477 US financial institutions; 2003–2013)	Panel Regression; Multiple Regression	Pre-crisis period (2003–2007): total compensation is positively associated with firm size, ROE, stock returns, and negatively with leverage. Post-crisis period (2009–2013): total compensation is positively linked to firm size, stock returns, weakly related to ROE, and negatively associated with leverage.
Beck et al. (2020)		
Executive compensation in Germany (DAX and MDAX companies, 80 companies changing over time, 2006–2018)	Panel Regression; Multiple Regression	Company size (measured by market capitalization) has a significant positive effect on total compensation, the median CEO pay ratio (CEO compensation/median salary of all employees) increased from 43 in 2006 to 53 in 2018; STIPs decreased substantially from 2006 to 2018, whereas equity grants increased significantly during this period; older and longer-tenured CEOs earn more than younger CEOs.

Source: Author's presentation; Note: ASX = Australian Stock Market Index; S&P 500 = Standard & Poor's Index comprising the 500 largest listed US companies; TSX = Toronto Stock Exchange; DAX = Main German Stock Market Index; MDAX = Mid-Cap German Stock Market Index; P&L = property & liability insurance

To conclude, the results shown above are quite mixed with no evident relationship between total compensation, compensation components, and firm results. It can be stated that fixed pay, variable pay, and total compensation have an association with governance and board characteristics, industry- and country specifics and particularly in relation to the firm size. Concerning performance indicators showing a significant association with CEO compensation characteristics, they are—particularly compared to non-business-related factors—rather weak. Generally, firm size (revenue or market capitalization) is found as the determining control variable in most research articles.

2.3.3 Recent Findings on Pay-for-performance in the Oil Industry

While the majority of the recent studies presented in Table 8 are cross-industry studies, there are only a few articles that deal with one industry sector only. This contrasts with the financial business sector (banks, insurance companies) which has received great attention before and after the financial crisis.

As for the oil industry, there are currently only three relevant papers on the pay versus performance relationship. Due to the large influence of the oil price on the performance of oil companies, the question is asked whether oil executives are paid for luck, whereby luck is defined as observable shocks to performance beyond the CEO's control (Bertrand & Mullainathan, 2001, p. 901).

Bertrand & Mullainathan (2001) investigated the pay and performance of the 51 largest American oil companies in the period from 1977 to 1994 and found that pay changes and oil price changes correlate well for CEOs as, in 12 out of 17 years analyzed, both variables went up and down together, which would suggest that executives were largely paid for luck. Indeed, CEO compensation was as much driven by oil price changes as it was by generic changes in company value. The other 5 years were years in which the oil price dropped but the pay did not. This was regarded as a sign of an asymmetry: while CEOs were always rewarded for good luck, they were not always punished for bad luck (Bertrand & Mullainathan, 2001, p. 908). Concerning the effect of Corporate Governance, the authors found that well-governed companies were better than poorly governed ones, and the presence of large shareholders significantly diminished the trend towards pay for luck (Bertrand & Mullainathan, 2001, p. 929). Large shareholders correspond

most closely to the idea of a principal in the principal-agent theory. Concerning the size of the boards, Bertrand & Mullainathan found no significant impact on pay for luck, although the number of insiders on the board led to a dramatic increase of the pay for luck phenomenon, whereby insiders in this context are current and former employees of the companies (Bertrand & Mullainathan, 2001, p. 925).

A recent study by Davis & Hausmann (2018) also examined the pay for luck topic by analyzing 80 major listed US exploration and production companies for the period 1992 to 2016. They indicated that executive compensation has changed significantly since the study by Bertrand & Mullainathan due to a substantial increase in the use of stock options, much more public scrutiny of executive compensation, and detailed regulatory rules concerning compensation disclosure and the involvement of shareholders. There was also the dramatic change of the oil and gas industry in the US because of the technological advances of hydraulic fracturing and the entry of many new players in this business. They also asked whether, under these circumstances, CEOs were still paid for luck (Davis & Hausmann, 2018, p. 1) and essentially confirmed the conclusions of Bertrand & Mullainathan by reasoning that, to a large degree, oil executives were still paid for luck, and benefitted from oil price fluctuations. This was not only the case for total compensation but also for the individual components including stock options, bonuses, and long-term cash incentives. They also confirmed asymmetry insofar as rising oil prices led to rising levels of compensation whereas sinking oil prices had a significantly lower impact on compensation. Regarding governance, their finding was that there is less pay for luck in companies where fewer executives sit on the board of directors. Interestingly, they found that pay for luck and the observed asymmetry was highest for highly paid executives and they concluded that the evidence is more consistent with rent extraction by executives than with increasing shareholder value (Davis & Hausmann, 2018, p. 2).

Shang et al. (2020) analyzed 125 Chinese companies in the period from 1999 to 2017, of which 20 companies were specializing in oil and gas exploration, 24 were other energy and supply companies, and 81 were manufacturing companies (Shang et al., 2020, p. 320).

Their conclusions are also largely in line with those of Bertrand & Mullainathan (2001) and Davis & Hausmann (2018), as they found a significant positive correlation between executive compensation and the market value of companies driven by the oil price (Shang et al., 2020, p. 321). They also confirmed the existence of an asymmetry, as executive compensation is more sensitive to good luck by rising oil prices than the opposite by falling oil prices (Shang et al., 2020, p. 324).

Concerning performance, they found that state ownership and higher equity concentration are positively correlated with compensation, which contrasts with the findings in western regimes and is explained by big governmental institutions which cannot quickly and directly supervise the compensation of executives (Shang et al., 2020, p. 324).

In 2015, China introduced limits on executive remuneration which led to a decreased influence of luck on performance (Shang et al., 2020, pp. 323–324).

Table 9 summarizes the pay-for-performance link described by authors cited in sub-sections 2.3.2.1, 2.3.2.2, this section 2.3.3 and by authors mentioned in Eklund (2019, pp. 41–42). Concerning a positive association between pay and performance most of them are weak.

Table 9 Pay-for-performance link in research articles of various authors

	Link		
Author(s)	**negative**	**non-significant**	**positive**
Brickley et al. (1985)			✓
Jensen & Murphy (1990)			✓
Lambert et al. (1991)		✓	
Boyd (1994)		✓	
Akhigbe et al. (1995)	✓		
Hogan & Robinson (1995)	✓		
Hubbard & Palia (1995)			✓
Wallace (1997)			✓
Tosi et al. (2000)		✓	
Vafeas (2000)		✓	
Bertrand & Mullainathan (2001)	✓		
Brooks et al. (2001)			✓
Joyce (2001)			✓
Carpenter & Sanders (2002)			✓
Young & Buchholz (2002)		✓	
Grace (2004)			✓
Brick et al. (2006)			✓
Duffhues & Kabir (2008)	✓		
Nourayi & Daroca (2008)			✓
Rost & Osterloh (2009)	✓		
Sun et al. (2013)			✓
Balafas & Florackis (2014)	✓		
Müller (2014)		✓	
Eklund (2015)	✓		
Bussin (2018)			✓
Davis & Hausmann (2018)	✓		
Deloitte (2018)	✓		
Yang et al. (2019)			✓
Shang et al. (2020)	✓		

In conjunction with the data provided by Reda (2018; see Fig. 11) on the KPIs used in the compensation system design in the energy industry, it can be said that—regarding the short-term performance compensation—accounting-based indicators (mainly income) are the most frequently used KPIs and, in the case of long-term incentives, value-based indicators (mainly TSR) are most common (see Table 10).

Table 10 Pay-for-Performance Indicators in the Energy Industry

	Income	TSR	Capital Efficiency	Revenue	Cash Flow	Other
LTI KPIs	0%	60%	30%	0%	10%	0%
STI KPIs	58%	0%	8%	0%	25%	9%

Source: Author's presentation based on data by Reda (2018, pp. 41, 43)

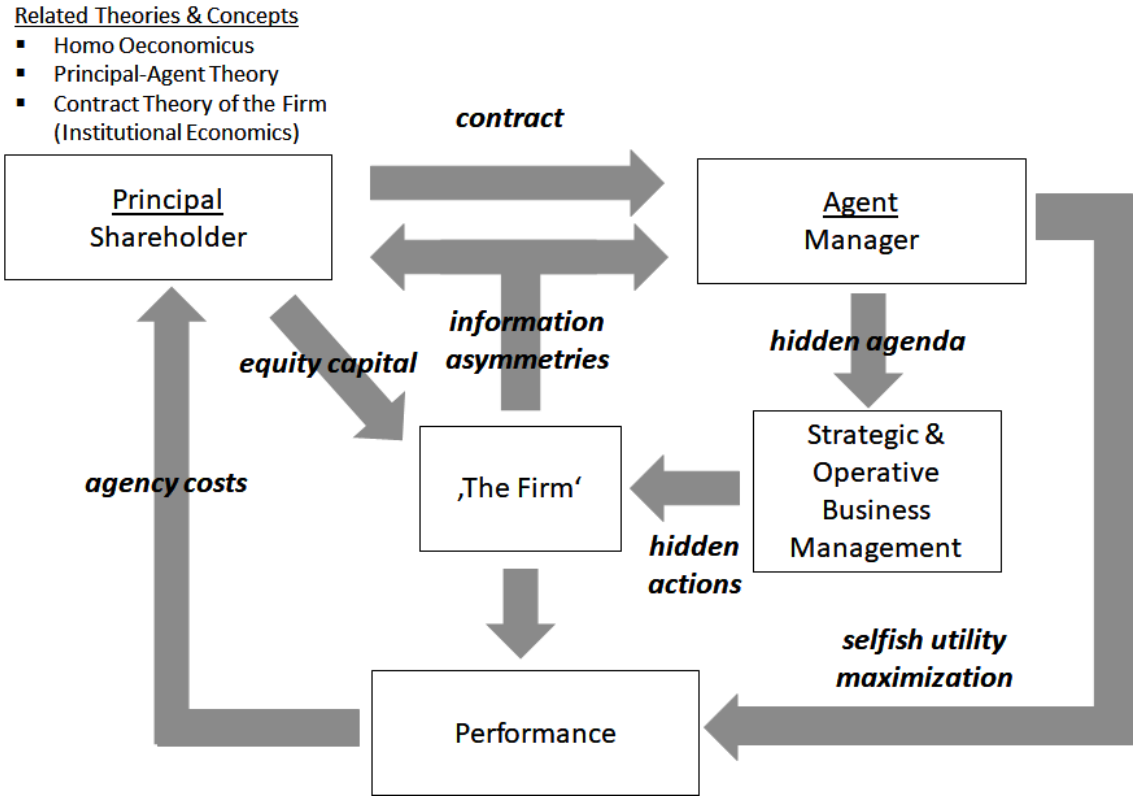
The TSR is more affected by the oil price than by accounting-based indicators that are assumed to be firm performance drivers such as book value, net income, operating margin, free cash flow, ROA, and ROE. In the case of energy companies, it should be questioned whether the TSR can be influenced by executives at all. Nevertheless, the TSR is the prevalent long-term performance indicator for the pay-for-performance policy in the energy industry.

Thus, the question arises as to which parameters are in the management's area of influence and can, consequently, be used as performance indicators and as effective incentive tools to align the interests of principals and agents. There is de facto no definite answer to this question, hence this gives rise to the assumption that energy executives are, at least to a certain degree, "paid for luck", which is not satisfactory for either side of the principal-agent contract.

2.4 Chapter Summary and Conclusions

To sum up the general topics of the research framework chapter, a compensation scheme design—as the realization of corporate governance in the remuneration policy space—is an instrument to align the interests of shareholders and managers and to find a solution for the principal-agent issue. In this context, the main challenges are a hidden agenda of the management and, as a consequence, hidden actions, which may remain unobserved by the principal due to information asymmetries (see Fig. 12).

Figure 12 Principal-Agent Issues within a Firm

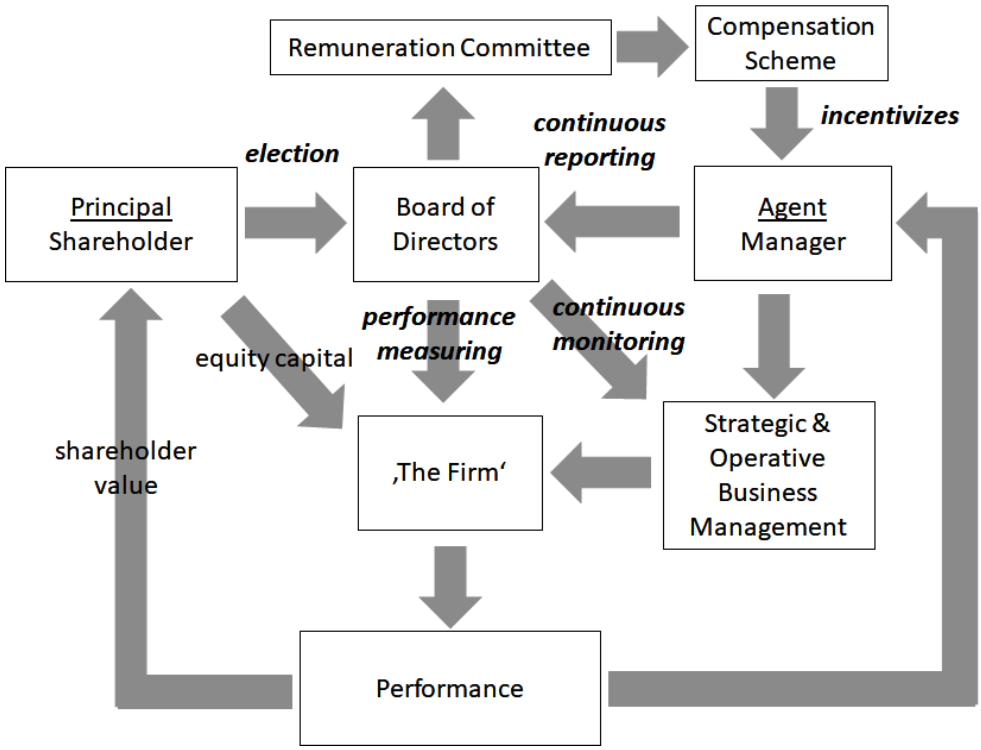


Source: Author's presentation

To control these issues, several corporate governance instruments are defined by a legal framework and/or business practices, such as company boards, remuneration committees, defined performance reports, performance-based compensation plans, and other instruments (see Fig. 13).

However, as already mentioned, empirical research has only provided ambiguous evidence on the effects of the various components in CEO compensation plans on firm performance.

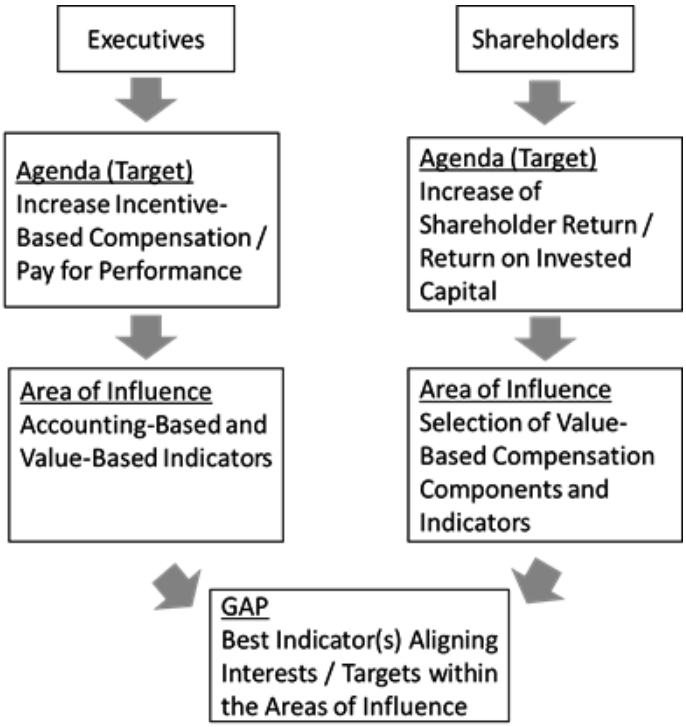
Figure 13 Governance Solutions for Principal-Agent Issues



Source: Author's presentation

Moreover, the issues concerning the use of financial performance measures show that cross-industry samples provide inconsistent results because these measures show large differences between the sectors following their specific business logic and business models. Therefore, it can be assumed that industry-specific samples provide more consistent and less ambiguous answers if industry characteristics in the compensation design and performance measurement are recognized and operationalized to provide evidence-based recommendations (see Fig. 14).

Figure 14 Research Issue and Research Gap



Source: Author's presentation

3 Research Design

This chapter deals with the research philosophy of this thesis, the research approach, the data model, the sampling and collection of data and the data analysis methods applied.

3.1 Research Philosophy and the Model of Observed Reality (Data Model)

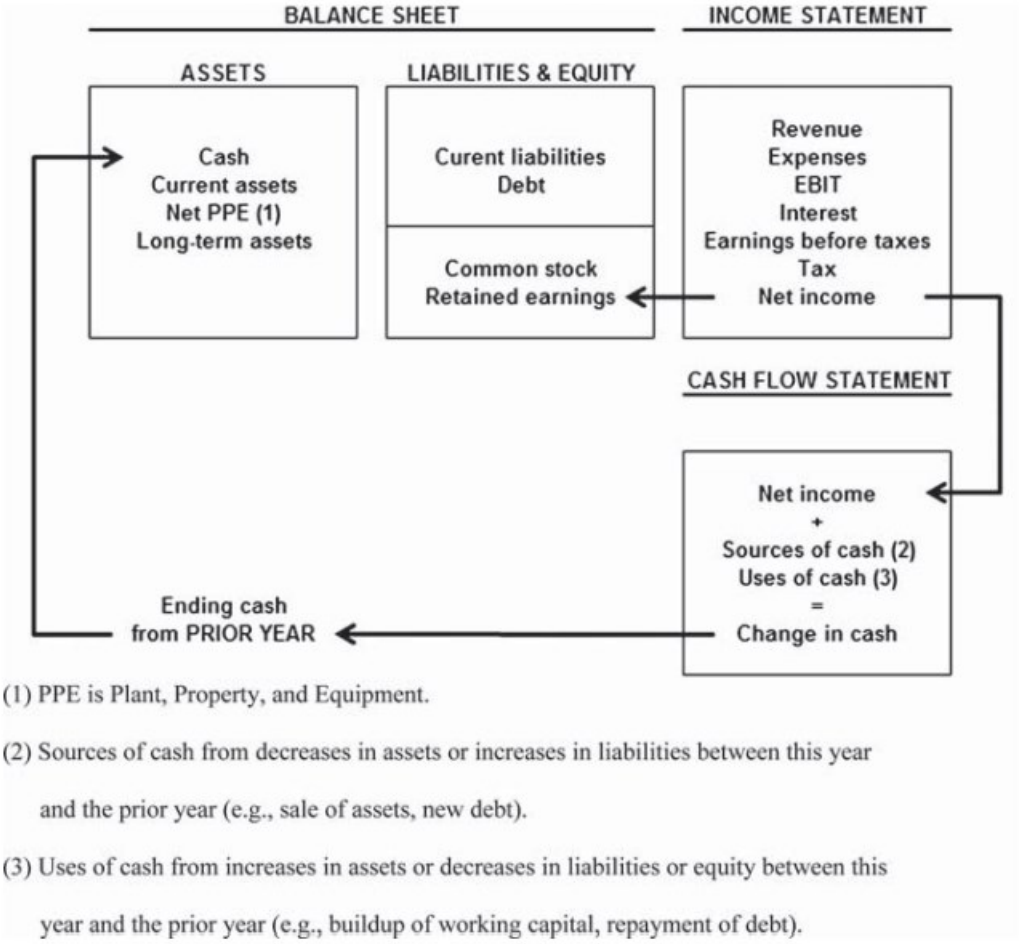
The development of a research design should begin with a discussion of the researcher's research philosophy, which consists of a system of beliefs and assumptions about the development of knowledge. A consistent set of assumptions will constitute a credible research philosophy which in turn will determine the methodological choice, research strategy, data collection techniques, and analysis (Saunders et al., 2019, pp. 130–131).

The selection of a general research approach or the preference for certain methods reduces the range of options in the field of research strategies (Easterby-Smith et al., 2015, p. 95). To comply with the purpose of this thesis, positivism was favored as a research philosophy. The main idea of positivism is that the social world exists externally and that its properties can be measured by objective methods. It is generally believed that positivism is the best approach for investigating human and social behavior (Easterby-Smith et al., 2015, p. 51).

Positivism follows the philosophical approach of the natural scientist and works with observable social realities to produce law-like generalizations. Organizations and social entities are seen as real in the same way as physical objects and natural phenomena. A positivist researcher tries to remain neutral and detached from their research and data to avoid influencing the findings (Saunders et al., 2019, pp. 144–146).

Thus, the question of the nature of reality observed in firm performance arises. In this thesis, management activities and compensation practices are observed through accounting and operational data and compensation components that are reported in the companies' annual statements and remuneration reports. Consequently, the basic model of this research is the accounting-based model of the firm resulting from regulatory standards (see Fig. 15).

Figure 15 Accounting-Based Model of the Firm



Source: Tjia, 2009, p.4

Such a model defines the calculated relationships between defined variables and is based on consistent and objective data—collected and structured by standardization—thereby excluding subjectivity to a large extent.

The accounting-based model of the firm can be viewed as an objective representation of a socially constructed reality on the basis "*that accounting is a quantitative representation of a firm activity"* (Zambon, 2015, p. XVIII). Therefore, the accounting-based model of a firm is the main reference frame of this research that represents the model of observed reality.

3.2 Research Approach and Research Procedure

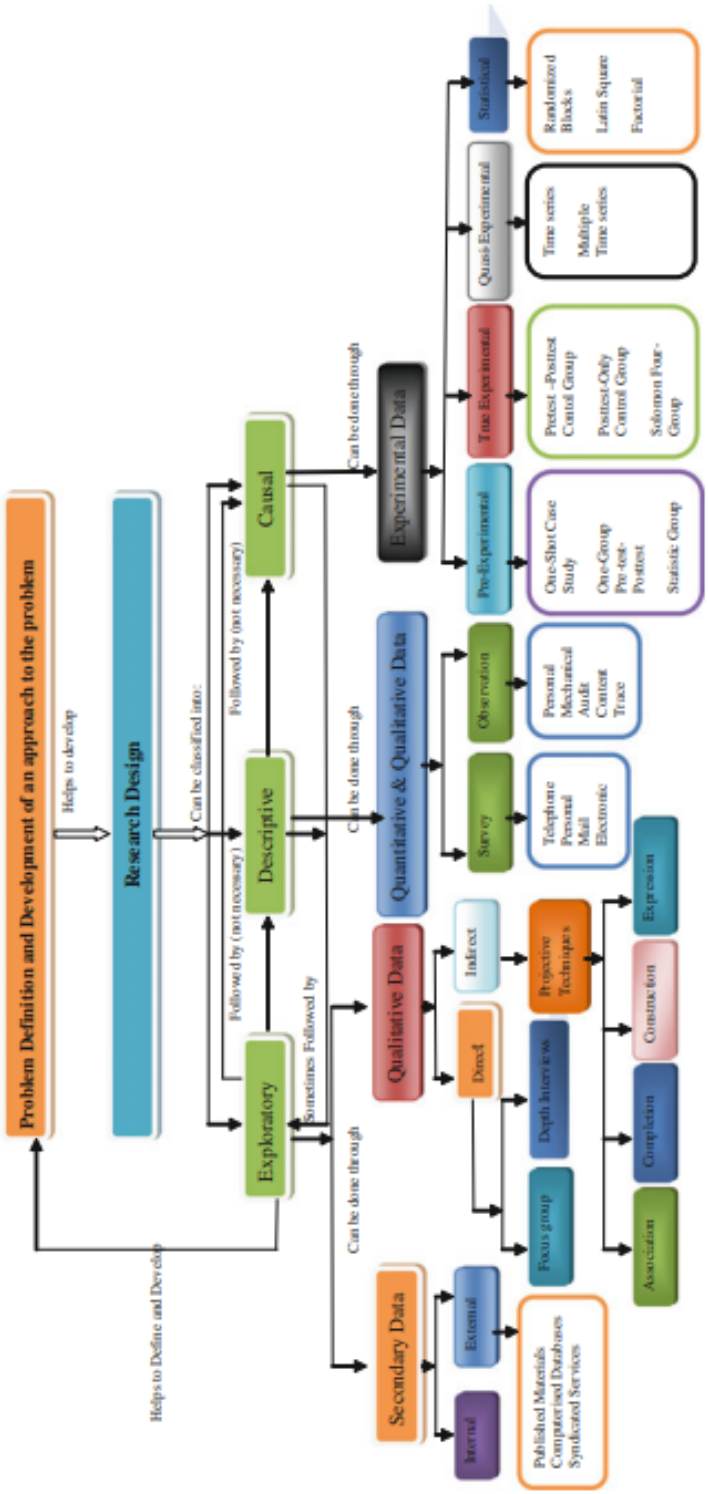
This study analyzed structured numerical data using statistical data analysis. Hence, it follows a quantitative approach. Quantitative studies pursue a confirmative or exploratory goal depending on the research questions and the existing research models provided by prior research (Rupp, 2013, pp. 520–521).

Exploratory research does not refer to existing research models by selecting a limited or defined scope of observations following a given model and therefore does not formulate any hypotheses concerning the relationship of the elements of the observed reality. Instead, quantitative-exploratory research aims to discover the linkage between elements of the observed reality and to explore cause-effect relationships by applying structure-discovering data analysis methods, such as path analysis, multiple regression analysis, or factor analysis to find a structure among multiple variables (Stoetzer, 2017, pp. 5–7).

This thesis is based on the classification of research design approaches provided by Sreejesh et al. (2014, p. 29; also see Fig. 16) and thereby:

- searches for the cause-effect relationship of variables that are examined in firm performance research and management compensation research,
- follows exploratory research because of the multitude of models and inconsistent findings in both research areas to date,
- uses external secondary data available as structured data, collected in a standardized form in the framework of external reporting and provided by two specialized data providers.

Figure 16 Research Design Approaches



Source : Sreejesh et al., 2014, p. 29

The data analyses were carried out in five steps, by applying (see Fig. 17):

- descriptive statistics to characterize the sample,
- multiple regression analysis for exploring cause-effect relationships,
- t-Testing for investigating differences between groups of high and low-performing companies.

Figure 17 Research Approach and Procedure

Step 1	Descriptive analysis of the sample including firm performance indicators, indicators for management activities and efficiency, and compensation ratios.
Step 2	Exploration of relationships between compensation ratios and firm performance in terms of qualitative growth (net income growth), quantitative growth (revenue growth), and shareholder value (TSR).
Step 3	Exploration of relationships between management activities and firm performance in terms of qualitative growth (net income growth), quantitative growth (revenue growth), and shareholder value (TSR).
Step 4	Testing for final models for all three performance indicators by including all significant factors from both factor groups (compensation ratios as well as management activities and efficiency ratios).
Step 5	Examination of TSR group differences concerning management activities and compensation plan ratios.

Source: Author's presentation

3.3 Data Model and Data Structure

As mentioned in Section 3.1, this research relies on the accounting-based model of the firm and assumes that each business-relevant activity can be tracked by analyzing accounting data that provide the basis for interpreting cash flow statement items, balance sheet items, and income statement items and the ratios calculated on the basis of such items. These facilitate the examination of:

- management activities on the business operations level using income statement data,

- investment and divestment activities, and financing activities using cash flow statement and balance sheet data.

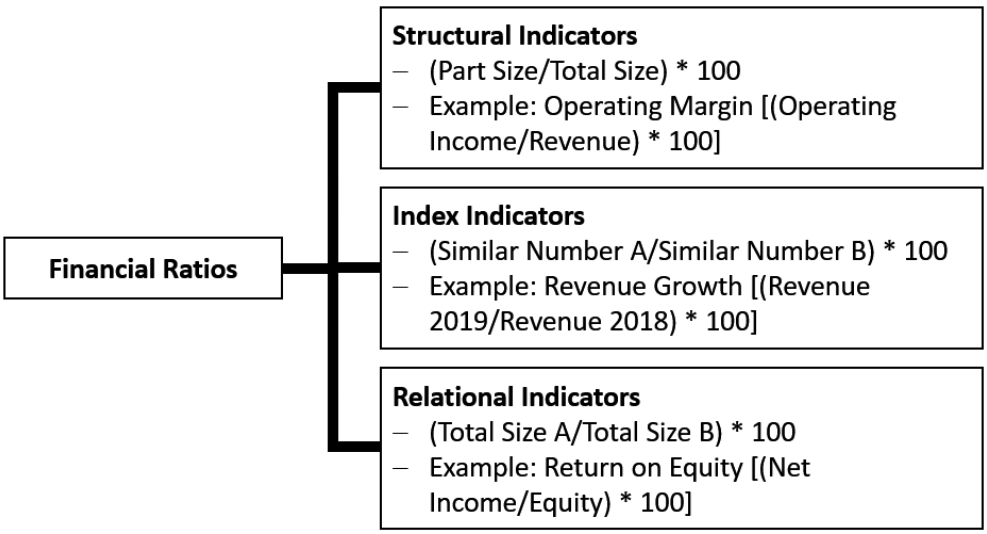
The operational data to measure management performance can be taken from annual reports. Such data are, for example, oil and gas production, oil and gas reserves, and finding the cost per barrel.

In the case of listed companies, the accounting data used for annual reports are collected and presented according to international standards, i.e., International Financial Reporting Standards (IFRS) or the Generally Accepted Accounting Principles (US-GAAP), to meet legal and regulatory requirements. Therefore, such data are structured numerical data, and the data of different companies are highly comparable.

The basis of the financial analysis is the absolute figures included in financial statements. Financial statements are a compilation of financial data, arranged systematically in line with accounting principles to gauge the financial position of a company concerning profitability, operational efficiency, solvency, and growth potential (Bhattacharyya, 2011, p. 57). Absolute figures (basic figures) can be differentiated into individual figures (e.g., revenue), mean values (e.g., average annual revenue), differences (e.g., profit as the difference between revenue and cost), and totals (e.g., balance sheet total) (Jung, 2014, p. 158).

For a more detailed analysis of financial information, financial ratios are calculated (see Fig. 18).

Figure 18 Typology of Financial Ratios and Examples



Source: Author's presentation referring to Holland and Scharnbacher (2010, pp. 60–66)

Ratios or relative figures enable a greater depth of information. These describe a relationship between different absolute figures, thus presenting an information gain beyond the individual absolute figures and are referred to in the business context as key figures providing condensed information on quantifiable operational facts or processes (Schroeter, 2002, pp. 262–263; Holland & Scharnbacher, 2010, p. 59).

Ratios can be differentiated into (1) relationship figures, (2) classification figures, and (3) index figures (Holland & Scharnbacher, 2010, p. 59; see Fig. 16):

(1) Relationship numbers (ratios) compare or establish a relationship between absolute numbers of different totals as a quotient of two different totals (Holland & Scharnbacher, 2010, pp. 61–63). A typical example of such a ratio is the ROE as a relationship between profit and equity.

(2) Breakdown figures (structural numbers) establish a relationship between a partial mass or partial size and the superordinate total mass or total size as a quotient of partial size and total size (Holland & Scharnbacher, 2010,

pp. 60–61). This is the case, for example, with the profit/sales ratio or the return on sales.

(3) Index figures (e.g., price, quantity, or value indices) relate similar but temporally or locally different variables to one another (Küpper, 2005, p. 360).

The formation of ratios is based on the principle of correspondence: the individual elements of the ratios (ratio figures) should be in a logical and meaningful relationship so that a gain in knowledge can be realized (Behrens & Feuerlohn, 2018, pp. 342–345).

The selection and calculation of ratios as management activity and efficiency indicators in this study are explained in further detail in Section 3.4.

Concerning management incentive systems, five groups of financial/economic management performance indicators are generally discussed in the literature (see Table 11):

Table 11 Compensation Performance Metrics

Category	Examples of performance criteria
1. Financial indicators (accounting-based indicators)	- Profitability ratios - Cash flow growth - Return on investment (ROI) - Return on assets (ROA) - Revenue growth - Income growth
2. Market-based indicators (market price, dividend payout, economic value added, and other market-based metrics)	- Absolute or relative market value - Total shareholder return (TSR) - EVA (Economic value added) - Market capitalization growth
3. Economic value (of a strategy, business unit, or enterprise)	- Earning power growth - Net present value growth
4. Strategic performance factors	- Market share growth - Product quality increase - Innovation rate increase
5. Mixed approaches	- e.g., ROI and revenue growth

Source: Author's presentation based on Winter (1996, p. 109)

The cash flow has an advantage compared to the profit figures as it remains unaffected by depreciation and is, therefore, not adverse to investment activities. Nonetheless, it is also history-based and does not consider strategic decisions. The same applies to the ROI and the ROA. Revenue is only partially suitable as a measure of success because it ignores the cost incurred.

The performance metrics of financial indicators can be taken directly from the companies' accounting system and are calculated based on such data. They are, therefore, easy to collect and not subject to debate. Accounting data are controlled by an external auditor, making their manipulation difficult albeit not impossible (Oringel, 2012, pp. 13–14).

Profitability ratios have outstanding importance because profitability is a widely accepted management performance indicator. These ratios show the combined effect of liquidity, asset management, and debt management on operating results (Vallabhaneni, 2020, p. 213). However, as profitability ratios are also based on historical data, they do not consider the future impact of strategic decisions or investments. The emphasis on profits can induce executives to reduce strategic investments and to put too much importance on short-term targets at the expense of longer-term goals, thereby jeopardizing the existence/survival of the company. The focus on profits can also reduce investment into research and development, as under US GAAP such expenditures must be expensed as incurred (Deegan, 2014, p. 296).

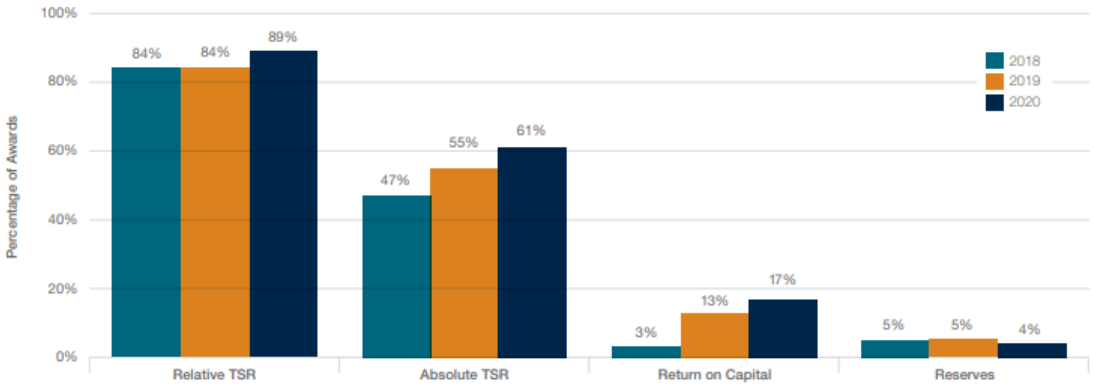
Concerning market-based indicators (shareholder-oriented ratios), further issues can potentially arise. In line with the concept of shareholder value, it is assumed that in efficient capital markets, all information about the company's future performance is available and that the prospects are thus also considered. This is known as the efficient market hypothesis (Sloman & Wride, 2009, p. 266) and the performance indicator could quickly and easily be derived from the stock market prices. Unfortunately, stock prices are also determined by factors beyond the control of management, such as the general economic situation, business cycles, or the industry-specific situation. A frequently applied solution is to put the market value of a company in relation to those of competitors (relative market performance measurement by peer group comparison) and to consider whether the own market value has developed better or worse than that of competitors. However, in this case, difficulties can arise from the choice of the competitor set. Hence it may happen that executives are rewarded for a good relative performance despite a poor or negative share price development, thereby harming shareholders (Mercer, 2009, p. 154). Due to the nature of their business, firms involved in the mining and oil business have greatly fluctuating accounting earnings and successful strategies will not provide positive earnings for several years. For this reason, it is quite common to reward managers in terms of market value, which is largely influenced by expectations of future cash-flows (Deegan, 2014, p. 298).

Despite the weaknesses and inefficiencies of market-based data, most articles on empirical research in the field of pay-for-performance use the TSR (absolute and relative) as a viable performance indicator (see Section 2.3.2.2). Moreover, as was shown in Table 10, the TSR is the preferred compensation LTI in the energy sector.

There is considerable debate in the literature concerning whether to use absolute or relative TSR. Relative TSR is measured by comparing a firm's TSR with those of a selected peer group or an industry index. Stock markets are subject to vagaries of economic cycles and general market conditions that are beyond the control of company executives. If compensation is tied to the absolute TSR, this can lead to undeserved rewards despite poor company performance in cases where the markets perform strongly and can punish despite strong and successful efforts by executives in case the markets perform weakly. The challenge with relative TSR is the selection of an appropriate peer group or an adequate index for performance comparisons (Kesner & Kwech, 2016, p. 1). Although the selection of peer groups is important for defining CEO pay, it is also quite arbitrary as there sometimes is a tendency that firms to choose competitors with highly paid CEOs, or they set benchmarks by choosing competitors that are higher ranked in the compensation distribution and thus boost CEO pay (Faulkender & Yang, 2010, p. 369).

A recent analysis of compensation arrangements of the 68 largest listed US E&P companies showed that in the year 2018, 84% of companies used the relative TSR and 47% the absolute TSR as performance metrics. In 2020, these figures were 89% and 61% respectively (Alvarez & Marsal, 2020/21, p. 19; see also Fig. 19).

Figure 19 Common Performance Metrics in the E&P Industry



Source: Alvarez & Marsal, 2020/21, p. 19

As 85 individual exploration and production companies were analyzed in this thesis, it was not possible to choose a common peer group, and thus the evaluations were made based on the absolute 3-year TSR. This aligns with an analysis by a big Canadian Pension Fund that examined 45 large and mid-cap North American E&P companies and found that 38 companies had their LTI tied to relative TSR. "*With this framework management is rewarded not for enriching shareholders, but for outperforming peers, regardless of absolute share price performance*" (Ontario Teachers, 2018, p. 2). Moreover, by using the absolute TSR, all 85 companies were evaluated by using the same standard.

Whichever kind of TSR is used, it is the most impactful performance measure for the pay-for-performance quantitative screen (ISS, 2020, p. 5).

In this thesis, the 3-year absolute TSR was used as the market-based KPI, and revenue growth and net income growth were used as accounting-based KPIs to measure the performance of E&P companies and their CEOs as their main representatives. As shown in Section 2.3.2.2, the 3-year TSR represents the total return of common stock over a 3-year period, including share price appreciation/depreciation and the reinvestment of dividends.

3.4 Sampling, Data Collection, Preparation, and Variables Set

Concerning the sampling, it is to be noted that:

- The database of the research results was derived from the fusion of two custom-made databases provided by EQUILAR, a cross-industry compensation data provider, and EVALUATE ENERGY, a specialized financial and operational data provider for the oil and gas industry.
- The selection of data focused on companies listed on the US (NYSE, NYSE American, NASDAQ) and Canadian (TSX, TSXV) stock exchanges because both countries provide comparable compensation data due to the convergence in the public reporting of such data. Moreover, both the US and the Canadian compensation disclosure regulations are identical (Tinaikar, 2017, p. 33). As the US was the top-1 and Canada the top-4 global oil producers in 2018 (U.S. Energy Information Administration, 2019), it can be assumed that a representative share of the global E&P companies is included in this sample.

To sum up the sampling approach, the sample can be considered as homogenous due to comparable regulatory regimes and their effects on firm performance and compensation plan design.

Concerning the observation period, it is to be noted that:

- The base year is 2012 and the end year is 2018. There are two reasons for selecting this period: the differences between pre-crisis and post-crisis corporate governance regulations as discussed in Section 2.3, and the increasing level of the incompleteness of older compensation data. There is also an increasing focus on shareholder value in the post-crisis research, with a corresponding level of importance attached to the TSR in compensation plans.
- The data were collected in September 2019. Consequently, the final observation year is 2018 as the last complete fiscal year. With 2012 as the base year, all change rates of financial and operational data were calculated as year-over-year change over 6 years. Thus, the observation period is 6 years.

- As regards the observation period, it must be mentioned that there was a drastic drop in the oil price starting in September 2014 which continued until 2016 and was thereafter followed by a gradual increase in 2017 and 2018 (see Fig. 23 in Appendix C). However, as the discussion of the descriptive statistics shows (see Section 4.1), the sample's companies have high growth rates and margins, and it can thus be asserted that there is only a low time selection bias in the sample. Some regression models (see Section 4.4) show that the oil price—which was used as a control variable—has a substantial impact on the performance indicators.

Concerning the data preparation, it is to be noted that:

- During the observation period, about 130 oil and gas exploration and production companies were listed on the New York and Toronto stock exchanges. A cutoff was made for companies with a market capitalization of less than 100 million USD at the end of 2018 to ensure meaningful company sizes within the sample. This resulted in 85 companies (see Appendix A, Table 28). In 2018, 40 companies had the primary listing on the NYSE, 36 on the TSX, 6 on the NASDAQ, 2 on the NYSE American, and 1 on the TSXV. All financial data are given in USD, and the data for Canadian companies are converted with the average yearly cross-rate USD/CAD.

There were changes in the number of companies during the observation period that led to partially incomplete annual data sets for several of these companies. Overall, 70 companies have complete data for all 6 years and 7 companies for 5 years, which thus represents 91% of the sample. A total of 9% of the companies have data for less than 5 years but were also included in the sample. In total, a set of 477 cross-sectional (annual) data was available for the study. As the majority of firms have complete data for the whole observation period this allowed for longitudinal (panel) research.

A large number of accounting-based variables, market-based variables, operational variables, and compensation variables are used to represent firm performance metrics, management activities, and management efficiency (in terms of investing behavior, resource allocation, operations efficiency, capital allocation

efficiency, and compensation plan characteristics. Following the firm performance indicators used in firm performance research (see Section 2.1.1) and the pay-for-performance research's preferred performance indicator following the value-based management discourse (see Section 2.3.2), this research used revenue growth, income growth, and TSR as performance indicators (dependent variables) in the regression analysis.

The variable set includes (also see Appendix B):

(1) 22 Management Activity and Management Efficiency Indicators,

(2) 15 Compensation Components Data,

(3) 25 Compensation Structure Ratios,

(4) 5 Control Variables,

(5) 3 Performance Variables as dependent variables (criteria).

Consequently, 70 variables were available to perform the calculations. In a first step, the effects of all 22 management activity and efficiency indicators and, in a second step, the effects of all 25 executive compensation structure ratios on the criteria were tested. Both analyses included control variables (see Appendix B, 3) such as the oil price and GDP growth as these were found to be exogenous factors in prior studies (Rasmussen & Roitman, 2011, p. 10). Many studies use revenue as a proxy for firm size as a control variable, and the CEO tenure is also sometimes used to control for the changing managerial power of executives or their attitude towards risk as they run the business (Ali & Zhang, 2015, pp. 60–61; Hou et al., 2014, p. 3).

The group of management activity and management efficiency indicators comprised three subgroups of variables (see Appendix B, 1a–1c):

(1) six management efficiency variables, such as the ROCE and the ROA, reflect the efficiency in the use of companies' capital and assets,

(2) five CAPEX-based allocation ratios, such as the CAPEX-to-revenue ratio or the CAPEX-to-PP&E (Gross Plant, Property and Equipment) ratio, serve as indicators of the investment intensity and the yearly addition of investment to the capital stock; the debt-equity ratio (total liabilities/capital) caters for the leverage of companies,

(3) 11 E&P operational indicators such as the oil & gas output growth or the R/P ratio (proven oil & gas reserves/oil & gas production) represent the ability of companies to grow production and to demonstrate how many years the production can theoretically be maintained with the respective reserves base.

The management activity and efficiency indicators were taken from the EVALUATE ENERGY database.

The second group of indicators provided information on the compensation design structure and the compensation efficiency (see Appendix B, 2a–2b):

(1) 15 variables illustrated the number of compensation components, such as the base salary and the total value of unvested IP shares,

(2) 19 compensation plan efficiency variables are largely ratios between the compensation components and the TEC (total executive cost) plus several indicators describing, for example, the ratio between the LTIP to the STIP and the fixed pay to the variable pay,

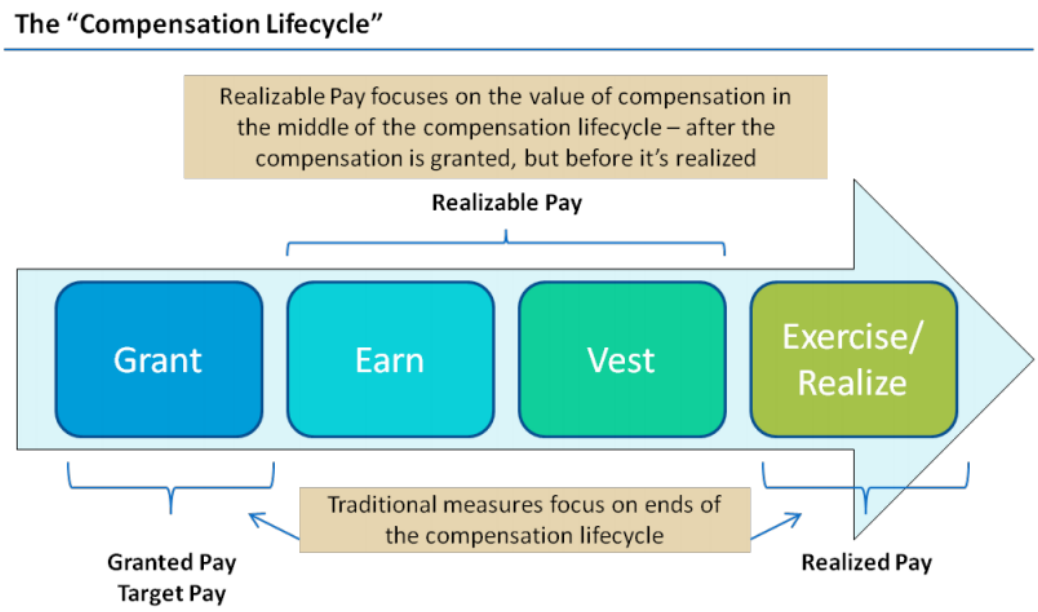
(3) six variables display the remuneration policy efficiency such as the total executive cost/OCF ratio or the STIP/OCF ratio.

All compensation data and the data on the CEO tenure were taken from the EQUILAR database. Pension entitlements were excluded, as the values in the SCT reflect changes in the actuarial present value of accumulated pension benefits and are not based on performance.

The EQUILAR database provides valuable additional data that allow for the analysis of the compensation plans in more detail. There is an intense debate among scholars and proxy advisors as to which data to use for the LTIP. The LTIP in the Summary Compensation Table (SCT), as required by the SEC executive compensation disclosure rules (and similar regulation in Canada by Form 51–102F6 Statement of Executive Compensation) and as contained in the proxy statements of listed companies, has been criticized for its reliance on grant-date accounting values (mostly grant-date Black Scholes values) for equity-based compensation. Therefore, stock options and SAR exercises, and the vesting of stock were ignored. Black Scholes valuations of stock options and SARs are based on assumptions concerning stock price volatility, the expected term of the award, and

the exercise price. Moreover, the Black Scholes method is based on a retrospective share price performance, which entails that the estimated future value of stock options and SARs is based on historical stock price information. As future stock prices are often different from past performance, large differences can arise between the estimated grant-date value of the equity awards and the realized amounts (Tonello, 2012, p. 4). An alternative and probably better way to show the value of the LTIP is by using realized and realizable pay. Realized pay comprises the actual earned cash compensation (base salary and cash bonuses), actual payouts under performance share or performance cash awards, and the value of exercised equity incentives during the accounting year (Tonello, 2012, p. 7). Realizable pay replaces the grant-date value of equity as used in the SCT with the value of equity that executives may realize based on the actual stock price performance on a specific date. It measures the intrinsic value of equity awards over a multi-year period, which is the actual value of stock for stock awards such as restricted stock and restricted stock units and the difference between actual stock prices and exercise prices for stock options and SARs, calculated as of the end of the most recently completed fiscal year (Tonello, 2012, p. 10). Whereas traditional executive pay metrics focus on the end of the compensation lifecycle, when the pay is granted and when it is realized, realizable pay focuses on the middle of the compensation cycle, after it has been granted but before options or grants have been realized (ISS, 2013, p. 2; see Fig. 20).

Figure 20 Granted, Realized and Realizable Pay



Source: ISS, 2013, p. 2, Realized and Realizable Pay are used for this thesis and are shown in Appendix B, 2a

To date, there is no generally accepted way of defining realizable pay and although no new rule is available, increasing numbers of companies use this measure in addition to the presentation in the SCT. In 2018, 13% of S&P 500 companies provided realizable pay as a supplement to the SEC's disclosure requirements in the SCT (AON, 2019, p. 1). Table 12 depicts definitions of realized pay and realizable pay (Mercer, 2014, p. 2).

Table 12 Realized and Realizable Pay

Compensation element	Accounting standards	Realized pay	Realizable pay
Salary	Salary for fiscal year	Same	Same
Bonus/ non-equity incentives	Bonus earned for fiscal year	Same	Same
Options/stock appreciation rights (SARs)	Grant-date fair value of awards granted during fiscal year	Actual gains realized at exercise during fiscal year	• *Options/SARs granted and exercised during the covered period:* actual gains realized at exercise, or period-end intrinsic value
			• *Options/SARs granted during the covered period and outstanding at end of period:* period-end intrinsic or Black-Scholes value
Stock awards (service-based vesting)	Grant-date fair value of awards granted during fiscal year	Vesting date value of awards vested during fiscal year	• *Restricted stock (RS) and restricted stock units (RSUs) granted and vested during the covered period:* vesting-date value or period-end value
			• *Unvested RS and RSUs granted during the covered period:* period-end value
Stock awards (performance-based vesting)	Grant-date fair value of awards granted during fiscal year	Vesting date value of awards vested during fiscal year	• *Performance periods that began and ended during the covered period:* actual value paid out*
			• *Performance periods that began during the covered period and are still in progress:* period-end value based on target or estimated performance
Cash long-term incentives	Amount earned for performance periods that include fiscal year	Same	• *Performance periods that began and ended during the covered period:* cash paid*
			• *Performance periods that began during the period and are still in progress:* cash value based on target or estimated performance
Perquisites and other benefits	Perquisites and all other compensation	Often included, as reported according to accounting standards	Sometimes included, as reported according to accounting standards

**May also include actual value paid out for performance periods that began before the covered period and were paid out during the period*

Source: Mercer, 2014, p. 2

The compensation plan efficiency ratios use total executive cost (TEC; see Appendix B, 2b for details) as the denominator to calculate comparable values for each compensation component. They are considered as compensation plan efficiency indicators, as it is assumed that these components—following the pay-for-performance discourse and the incentive systems design theory discussed in Section 2.2—should have different effects on firm performance. This should enable the determination of which relative share of a specific compensation component has the highest impact on firm performance.

The remuneration policy efficiency ratios use the operating cash flow as a business performance reference (see Appendix B, 2b for details). These ratios indicate how much the important compensation elements, the total executive cost as well as the total cash payments consume from the operating cash flow. In general, a low ratio indicates a good remuneration policy efficiency and good corporate governance.

Finally, the purpose of the control variables needs to be explained in more detail. Controlling for a variable means that adding it to the model allows one to statistically examine and separate its effect from the effect of the study-relevant independent variables on the dependent variable. As mentioned in this section, the oil price and GDP growth were shown to be relevant variables for firm performance in the energy sector in previous research. The GDP growth is a demand indicator and the oil price a price signal, and both cannot be influenced by single firms but have an impact on the revenue growth. Revenue is a widely used control variable for firm size, and some studies also use CEO tenure as a control variable (see Appendix B, 3).

3.5 Data Analysis Methods

In this study, three statistical analyses were applied: (1) descriptive statistics, (2) multiple regression analysis, and (3) t-Testing. Descriptive statistics mainly describe measures of central tendency (mean, median, mode), measures of variability (standard deviation, variance), and minimum and maximum values of variables, multiple regression analyses examine the relationship between independent variables and a dependent variable, and the t-Test is used to analyze differences between groups of independent statistical samples. These statistical methods are standards in business and socio-economic research (Burns & Burns, 2008, pp. 6–9, 86–87).

The statistical analyses were performed using IBM's SPSS 27 software, which is a widely used statistical program in social sciences.

3.5.1 Multiple Linear Regression Analysis and Panel Data

The multiple regression analysis allows for the examination of complex cause-effect relationships between a multitude of independent variables (predictors) and a dependent variable (criterion) (Holtmann, 2010, p. 75).

The key assumptions of multiple regression are 1. the relationship between the independent variables and the dependent variable is linear, 2. the residuals (error terms) are uncorrelated, which means there is no autocorrelation, 3. the residuals are normally distributed, 4. the variance of error terms is similar across the values of the independent variables (homoscedasticity), 5. the independent variables are

not correlated with each other (multicollinearity), and 6. the regression coefficients are linear (Williams et al., 2013, pp. 8–11).

The multiple linear regression in the form of forward stepwise selection is frequently used in economic explorative research (Burns & Burns, 2008, pp. 396–397, Hastie et al., 2009, pp. 58–59). This approach allows for an examination of the effect of multiple predictors on the selected dependent variable without a specific assumption or prior knowledge of the effect of single variables (Thayer, 2002, pp. 2–4).

This thesis does not examine an existing model to confirm or reject it but uses a comprehensive set of data to develop an evidence-based model that shows the effect of independent variables on a dependent variable. It is an exploratory study for which the forward stepwise selection regression (forward regression) is appropriate (McCarthy et al., 2019 pp. 96–97).

The general multiple regression model formula is (Anderson et al., 2011, p. 554):

$$y = \beta_0 + \beta_1 \cdot x_1 + \beta_2 \cdot x_2 + ... + \beta_k \cdot x_k + \varepsilon_i$$

y = estimator of the dependent variable
x_k = independent variable k
β = regression coefficient of the variable x_k
ϵ_i = error term
β_0 = intercept or constant

The forward stepwise regression is used to predict the criterion by determining the significance and explanatory power of several predictors and their cumulative effect by stepwise addition of one significant variable after another until either all predictor variables are included or adding any of the remaining variables does not generate an improvement of the coefficient of determination r^2 (Burns & Burns, 2008, p. 396).

To select the final regression model, this thesis controlled for autocorrelation by means of the Durbin-Watson test and for multicollinearity in the form of the tolerance value (TOL) (Meyers et al., 2013, pp. 180–182; Baltes-Götz, 2019, pp. 130–133, 154–157). The TOL allows for an estimate of the variance for each independent variable to be explained by another independent variable. A TOL of 1 indicates the absence of multicollinearity issues whereas a TOL of less than 0.4

gives rise to concern (Allison, 1999, p. 141). This thesis defines the threshold for a final model as the last model of a forward selection regression including only predictors above the cut-off threshold of TOL > 0.6. Consequently, each regression model selected as a final model shows low multicollinearity effects and, thus, a high quality of explanatory power on the dependent variable.

Autocorrelation is another model quality issue that results from the use of panel data. The panel data regression analysis combines two data analysis approaches: (1) the cross-sectional analysis, and (2) the time series analysis:

- Panel data (or longitudinal data) are defined as a time series of cross-sectional data with the same set of units (Wooldridge, 2016, pp. 9–10) so that a panel regression can be considered as a repeated cross-sectional regression (Frees, 2004, Chapter 1, pp. 5–6).
- Panel data allow for a larger sample, and a larger sample enables better and more accurate estimates.

However, the regression of panel data can cause autocorrelation effects, which means a correlation between a predictor and itself, if this variable is measured at different points in time (serial correlation). To control for autocorrelation, this research used the Durbin-Watson test (DB test), which is regarded as the most used diagnostic instrument for this purpose (Favero & Belfiore, 2019, p. 493). The DB value can range from 0 to 4. A value of 2 entails no autocorrelation, values from 0 to less than 2 exhibit a positive autocorrelation, and values from 2 to 4 indicate a negative autocorrelation. To control for autocorrelation, the DB should show a value of larger than 1.5 and smaller than 2.5.

Multiple regression analysis often uses standardized ß-coefficients. This is needed when independent variables are measured in different units (for instance USD, age, percent) as it would be impossible to discern which of the independent variables have which impact on the dependent variable. A common method to transform non-standardized into standardized variables is to multiply the non-standardized coefficient for each independent variable by the standard variation of that independent variable and then divide it by the standard deviation of the dependent variable. Using standardized coefficients converts all coefficients to a

common unit of measurement, as they are unitless and therefore make comparisons easy (Menard, 2004, pp. 1069–1070).

Another important issue in multiple regression is the use of adjusted R^2 instead of the unadjusted R^2. The coefficient of determination R^2 indicates how terms fit a curve or a line. The adjusted R^2, however, adjusts for the number of terms in a model as there are often useless variables, which do not contribute to the explanatory power. Adjusted R^2 indicates the percentage of variation explained by only those independent variables that affect the dependent variable. The adjusted R^2 is always less or equal to R^2 (Moye, 2004, pp. 7–8).

3.5.2 t-Test

The t-Test is used for analyzing whether the mean values of statistically independent groups are statistically significant, i.e., statistically different. In this thesis, the t-Test was applied to analyze the differences between groups of companies distinguished by their TSR performance by applying the two-sample t-Test for independent groups. The key assumptions of the t-Test are:

1. The data values must be independent, which means that measurements for one observation do not affect measurements for other observations, 2. the data in each group are a random sample from the population, 3. the data in each group are normally distributed, 4. the variances of the two independent groups are equal, 5. The data are interval-scaled (Rasch et al., 2006, p. 59).

Differences are commonly considered as significant at the 0.05 significance level (Döring & Bortz, 2016, p. 664). Concerning the use of panel data, it can be stated that the t-Test is robust and generally used in time-series analyses (Wiedermann & von Eye, 2013, pp. 40–41).

4 Data Analyses Results

The data analyses are presented in six steps:

- Step 1 (see Section 4.1) discusses the descriptive statistics of business performance indicators and compensation data,
- Step 2 (see Section 4.2) examines firm size (revenue) effects on the compensation data based on analyzing bivariate correlations,
- Step 3 (see Section 4.3) delivers insight into the mean values of compensation components and their relative importance,
- Step 4 (see Section 4.4) explores firm performance predictors by multiple regression analysis with TSR, revenue growth, and net income growth as dependent variables (partial models),
- Step 5 (see Section 4.5) investigates the effects of management activities and remuneration policy on firm performance by multiple regression analysis and examines the explanatory power of combined (integrated) models,
- Step 6 (see Section 4.6) analyzes differences concerning executive compensation structure, management activities, and management performance between groups of above-median TSR and below-median TSR.

4.1 Descriptive Statistics

The descriptive statistics (see Table 13) are based on the 2018 data because it is the last year of the observation period and includes the complete data of all 85 companies in the sample. Concerning firm size, it should be noted that:

- The sum of revenues of all companies accounts for USD 281 Bn. This is equivalent to, for example, 62% of the 2018 Austrian GDP accounting for USD Bn 455.5 (Trading Economics, 2020),
- the range between the mean revenue and median revenue indicates a moderate left-skewed distribution and thus a higher share of relatively smaller companies in the sample,

- the largest company is Suncor Energy Inc. with revenues of USD 29,691m, and a net income of USD 2,537m (see Appendix A), that resulted in a net income margin of 8.5%,
- the smallest company is Evolution Petroleum with revenues of USD 41m and a net income of USD 20m (see Appendix A), resulting in a 49% net income margin. Thus, it should be noted that the smallest company exhibits high profitability, while the largest company only shows a one-digit net income margin.

Concerning the firm performance indicators, the following aspects should be considered (see Table 13):

- the median ROCE of 5% indicates a low efficiency of capital employed,
- the median revenue growth accounts for 36% (year-over-year), and the median net income growth is -27% (year-over-year),
- the median TSR (3 years) is low (-5%), which means that more than 50% of the companies show a negative 3-year TSR, although the median revenue growth exhibits a high firm size growth rate,
- these findings indicate that—whilst revenue growth is high—return figures and net income growth are low respectively negative. The bivariate correlation analysis shows that the TSR (3yr) has a moderate degree of correlation with revenue growth (17.5%) and a very low degree of correlation with net income growth (1.3%) (see the correlation matrix in Table 31, Appendix D).

Table 13 Descriptive Statistics of Firm Performance and Compensation (2018; Absolute Firm Performance in USD m; Compensation Data in USD; n = 85)

	N	Minimum	Maximum	Sum	Mean	Median
Revenues	85	40.77	29,691	281,101	3,307	1,075
ROCE	85	0.00	0.40	6.10	0.07	0.05
Rev. Growth	85	-0.29	1.76	32.71	0.39	0.36
Net Inc. Growth	85	-72.27	20.03	-67.91	-0.80	-0.27
TSR (1 Yr)	85	-0.67	1.11	26.47	0.31	0.34
TSR (3 Yr)	85	-0.95	5.40	6.12	0.07	-0.05
Mkt. Cap.	85	87.52	50,573	446,580	5,254	1,669
Base Salary	85	0.00	1,500,000	55,492,594	652,854	574,983
Bonus	85	0.00	3,442,974	11,136,939	131,023	0
Non-Equi.Incent. Plan (NEIP) Payouts	85	0.00	3,550,500	78,567,778	924,327	678,784
Other Comp.	85	0.00	2,159,107	12,161,267	143,074	50,215
Value Realized on Exercise	85	0.00	11,503,437	19,228,824	226,221	0
Value Realized on Vesting	85	0.00	23,891,169	202,941,193	2,387,543	997,467
Total Value Realized	85	0.00	23,891,169	222,170,017	2,613,765	1,042,150
Total Value of Exercis. Options	85	0.00	3,238,647	7,941,789	93,433	0
Total Value of Unexercis. Options	85	0.00	5,899,524	13,280,113	156,237	0
Total Value of Unvested Shares	85	0.00	25,467,117	175,707,892	2,067,152	665,955
Total Value of Unvested IP Shares	85	0.00	21,942,184	330,424,773	3,887,350	1,532,080
CEO Tenure (Yrs)	85	0.00	52.00	557.70	6.56	4.70
TEC	85	11,885	54,163,815	906,883,162	10,669,214	5,370,129
Base Salery / TEC	85	0.00	1.00	13.20	0.16	0.089
Bonus / TEC	85	0.00	0.50	2.31	0.03	0.000
NEIP / TEC	85	0.00	0.84	10.46	0.12	0.094
Oth. Comp. / TEC	85	0.00	0.18	1.60	0.02	0.009
Value Realized on Exercise / TEC	85	0.00	0.46	0.88	0.01	0.000
Value Realized on Vesting / TEC	85	0.00	0.70	15.94	0.19	0.180
Tot. Value Realized / TEC	85	0.00	0.70	16.82	0.20	0.192
Tot.Value of Exercis. Options / TEC	85	0.00	0.13	0.45	0.01	0.000
Tot. Value of Unexercis. Options / TEC	85	0.00	0.34	1.40	0.02	0.000
Tot. Value of Unvested Shares / TEC	85	0.00	0.73	15.10	0.18	0.156
Tot. Value of Unvested IP Shares / TEC	85	0.00	0.71	23.66	0.28	0.294
TCP / TEC	85	0.00	1.00	25.97	0.31	0.220
STIP	85	0.00	3,870,850	89,704,717	1,055,350	770,000
LTIP	85	0.00	51,196,934	749,524,583	8,817,936	4,376,185
TCP	85	0.00	5,170,850	145,197,311	1,708,204	1,490,548
LTIP / STIP	85	0.00	32.09	638.94	7.52	5.18
Fix. Pay / STIP	85	0.00	3.99	66.20	0.78	0.715
Fix. Pay / LTIP	85	0.00	0.88	12.72	0.15	0.096
Fix Pay / Var. Pay	85	0.00	3.77	16.81	0.20	0.094
Var. Pay / TEC	85	0.00	1.00	70.20	0.83	0.896
STIP / TEC	85	0.00	0.84	12.77	0.15	0.103
LTIP / TEC	85	0.00	0.97	57.44	0.68	0.761
TEC / OCF	85	0.00	0.07	1.35	0.02	0.011
STIP / OCF	85	0.00	0.01	0.16	0.00	0.001
LTIP / OCF	85	0.00	0.06	1.03	0.01	0.008
Fix. Pay / OCF	85	0.00	0.01	0.14	0.00	0.001
Var. Pay / OCF	85	0.00	0.06	1.19	0.01	0.010
TCP / OCF	85	0.00	0.02	0.30	0.00	0.002

Source: Author's calculation and presentation

Concerning the compensation components, it should be noted that (see Table 13):

- the maximum base salary accounts for USD 1.5m (Median = USD 0.575m), and the maximum non-equity incentive plan payout is USD 3.55m (Median = USD 0.68m, the maximum total value of unvested shares is USD 25.5m (Median = 0.666m),
- the sum of total executive costs of all companies is USD 907m, which is 0.32% of the sample's total revenue of USD 281bn,
- all minimum values for compensation components are equal to zero. The detailed analysis of the company data shows that two companies— Evolution Petroleum Corp. and Kelt Exploration Ltd.—do not pay a base salary, but only components of STIP and LTIP.

The S&P 500 CEO's compensation median accounts for USD 12.35m (2018), while the same value for Russell 3000 is USD 4.35m (2018) (Conference Board, 2019). The 2018 total executive compensation median of the sample of this thesis is USD 5.37m, which indicates that the CEOs of oil and gas exploration companies earn, on average, considerably less than the average S&P 500 CEO but more than CEOs of Russell 3000 companies. This finding should be considered as a size effect, as the S&P 500 includes the 500 listed companies with the highest US stock market capitalization, whereas none of the companies included in this sample is an S&P 500 index component. The Russell 3000 index tracks the 3,000 largest publicly traded US stocks and includes several companies in the sample such as Apache, Chesapeake, Devon, Hess, Murphy, Noble, and Occidental.

Further characteristics of the sample are (see Table 13):

- The median CEO tenure is 4.70 years, and the mean is 6.56 years, indicating notably short tenures on average,
- the sum of the included companies' market capitalization is USD 447 Bn. By comparison, the total market capitalization of the Dow Jones Industrial Average (DJIA) stock index including the 30 largest US companies was 8,332Bn in December 2019 (SIBLIS Research, 2020).

To summarize, although the CEOs of the sample had sizeable total pays in 2018, they were not among the top earners like those of the S&P 500 group. This is, as mentioned, largely a size effect but can also be explained by moderate to poor company performance in this year. E&P companies are also generally smaller than the large companies on US and Canadian stock exchanges.

4.2 Size Effects, Compensation Components and Compensation Structure Ratios (Bivariate Correlation Analysis)

As discussed, firm size is often included as a control variable in firm performance research. Before the total data set is explored by multiple regression analysis, the firm size to compensation components relationship is examined. As often used, revenue is applied as a proxy for firm size.

The bivariate correlation analysis provides further findings to triangulate the results of the descriptive statistics concerning the compensation data. Included are all compensation ratios and absolute values indicating compensation characteristics and firm size. The main results are (see Table 14):

- 6 of the 40 compensation characteristics show a medium (r = 0.3 to 0.5) and only 1 a strong correlation (r > 0.5) with firm size,
- the base salary shows the highest correlation with r = 0.518, followed by the TCP (total cash payments) (r = 0.442) and the NEIP (non-equity incentive plan) (r = 0.387),
- the total long-term incentive plan value and the short-term incentive plan value, the TEC (total executive cost), and Other Compensation also show only moderate correlations with firm size.

Table 14 Correlations between Compensation Variables and Firm Size (r > 0.3)

Compensation Variable	Firm Size (Revenue)
Base Salary	,518**
TCP	,442**
Non-Equi.Incent. Plan (NEIP) Payouts	,387**
STIP	,360**
TEC	,339**
LTIP	,314**
Other Comp.	,308**
**. Correlation is significant at the 0.01 level (2-tailed).	

Source: Author's presentation

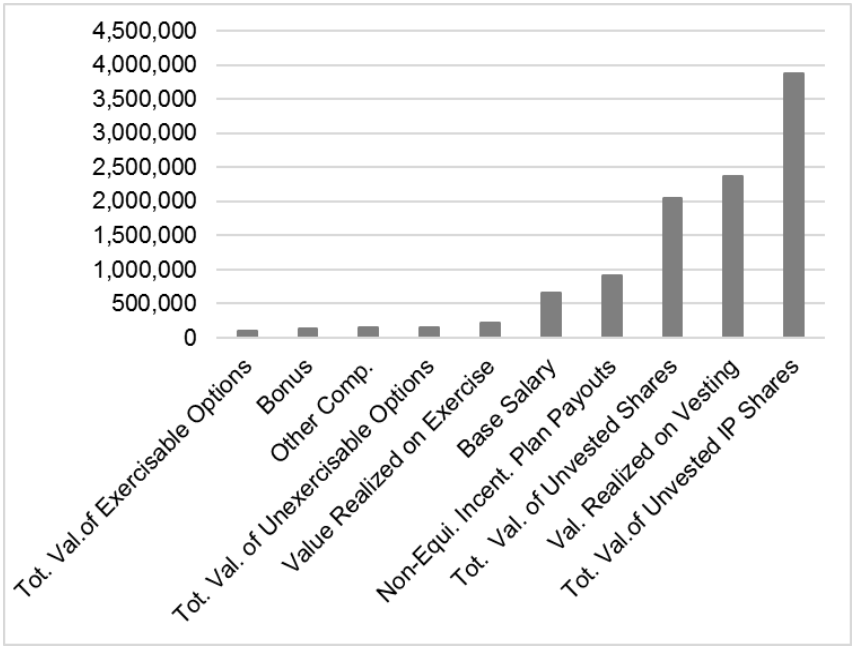
Firm size effects can be assumed for the base salary, total cash payments, the NEIP, the STIP, the TEC, the LTIP, and other compensation. Thus, the larger the company, the higher these elements of executive pay.

However, the compensation structure ratios and thus the compensation plan policy and the remuneration policy do not appear to be affected by firm size.

4.3 Compensation Components Effects

An analysis of the components of executive compensation shows that the highest value transfer to CEOs results from the total value of unvested IP shares, followed by the value realized on vesting and the total value of unvested shares, which are all parts of the LTIP (see Fig. 21).

Figure 21 Mean Values of Executive Compensation Components (2018, in USD)



Source: Author's presentation, Data from EQUILAR

Compared to the value transferred by unvested IP shares, the value realized on vesting, and the value of unvested shares (all LTIP elements, equity-related payments), the base salary, the bonus, and the non-equity incentive plan payouts (STIP components) represent only a relatively small share of executive compensation. These findings can be considered as a strong indication for placing the emphasis of compensation on the long-term rather than the short-term performance of companies. This is also supported by the LTIP-to-STIP ratio (mean) of 7.5:1 (see Table 13). Furthermore, the mean ratio of total cash payment (TCP) to total executive cost (TEC) is 31% (see Table 13), which indicates that the cash components account for a relativity small share of the total value transfer from the firm to the executive.

4.4 Firm Performance Predictors (Partial Models)

The data analysis for each dependent variable followed two steps:

- first, the forward stepwise regression was performed. Based on the results, the final model was determined as the last regression model in which

all included predictors comply with the defined TOL threshold (TOL > 0.6) to control for multicollinearity issues,

- second, the final model was analyzed concerning autocorrelation effects using the Durbin-Watson test requiring a value of d between 1.5 and 2.5.

4.4.1 Compensation Ratios and TSR (3 Years)

The independent variables entered in the regression analysis on TSR are:

- all 25 compensation structure ratios (see Appendix B, 2b),
- all control variables: GDP growth (US GDP, World GDP), oil price growth (WTI), firm size (revenue), and CEO tenure (see Appendix B, 3).

The stepwise forward regression on the TSR as dependent variable provides five models, with all meeting the requirements concerning autocorrelation and multicollinearity. Consequently, Model 5 was considered as being the final model. The Durbin-Watson test indicates a low level of positive autocorrelation, while the TOL indicates the absence of multicollinearity effects among the predictors (see Table 15). A total of 23 compensation (structure) ratios were excluded due to their insignificance, thereby reducing the number of significant compensation predictors to two variables included in Model 5.

Table 15 Compensation Ratios/TSR Regression Models (N = 477)

		Change Statistics			
Model	R Square	Adjusted R Square	R Square Change	Sig. F Change	Durbin-Watson
1	0.027	0.025	0.027	0.000	
2	0.043	0.039	0.016	0.005	
3	0.056	0.050	0.013	0.012	
4	0.068	0.060	0.012	0.015	
5	0.077	0.067	0.009	0.031	1.445

Coefficients

		Standardized Coefficients		Collinearity Statistics
Model		Beta	Sig.	Tolerance
1	(Constant)		0.000	
	Var. Pay/TEC	0.166	0.000	1.000
2	(Constant)		0.000	
	Var. Pay/TEC	0.149	0.001	0.983
	WTI Growth	0.127	0.005	0.983
3	(Constant)		0.000	
	Var. Pay/TEC	0.151	0.001	0.983
	WTI Growth	0.189	0.000	0.756
	US-GDP Growth	0.128	0.012	0.764
4	(Constant)		0.000	
	Var. Pay/TEC	0.170	0.000	0.955
	WTI Growth	0.190	0.000	0.756
	US-GDP Growth	0.138	0.007	0.759
	Bonus/TEC	0.111	0.015	0.967
5	(Constant)		0.889	
	Var. Pay/TEC	0.160	0.000	0.947
	WTI Growth	0.264	0.000	0.522
	US-GDP Growth	0.193	0.001	0.608
	Bonus/TEC	0.106	0.020	0.964
	World GDP Growth	-0.118	0.031	0.669

Dependent Variable: TSR (3 yr.) EQUILAR

Source: Author's calculation and presentation

For this model, it can be stated that:

- with adj. r^2 = 0.067 it shows a low explanatory power of 6.7% with four predictors exhibiting a positive effect on the criterion indicated by positive betas, whereby only the World GDP growth shows a negative beta,
- the variable-pay to total executive cost is the predictor with the highest relative explanatory contribution (adj. r^2 = 0.025),
- the exogenous variables—WTI price growth, US GDP growth, and world GDP growth —increase the explanatory power by 3.2%,
- the second compensation ratio bonus-to executive-cost only contributes 1% to the explanatory power,
- firm size and CEO tenure are not found as TSR predictors.

Although the final model's explanatory power is modest, it is a robust model which shows that elements of variable pay represent a certain, albeit very low, effect on the TSR, which can be expected from the compensation design theory and the principal-agent theory. The three control variables indicate that exogenous factors that are not within the control of executives also affect the TSR and can provide a windfall profit or windfall loss. However, it should also be emphasized that approximately 93% of the TSR variance remains unexplained by the compensation ratios and the control variables.

4.4.2 Compensation Ratios and Business Performance (Revenue Growth and Net Income Growth)

The independent variables included in the stepwise forward regression are:

- all 25 compensation structure ratios,
- all control variables: GDP growth (US GDP, World GDP), oil price growth (WTI), firm size, and additionally CEO tenure.

The main results of the revenue growth regression are that (see Table 16):

- the final revenue growth regression model (Model 6) shows a TOL > 0.6 for all included variables, while the Durbin-Watson test only displays small autocorrelation effects, both indicating a good model validity,

- five predictors show a positive effect (see the beta coefficients in Table 16),
- firm size (revenue) has a negative effect, which implies that the smaller the company, the higher the revenue growth, and vice versa,
- the WTI price growth is the predictor with the strongest relative effect on the revenue growth with nearly 22%,
- the three compensation variables un-exercisable options to total executive cost, variable pay to total executive cost, and bonus to total executive cost affect the criterion by 4.1%,
- the US GDP growth adds 1.7%, and the revenue 1.1% to the explanatory power,
- the total explanatory power is medium with approx. 29% (adj. $r^2 = 0.287$).

Table 16 Compensation Ratios/Revenue Growth Regression Models (N = 477)

Model Summary

			Change Statistics		
Model	R Square	Adjusted R Square	R Square Change	Sig. F Change	Durbin-Watson
1	0.219	0.218	0.219	0.000	
2	0.251	0.248	0.032	0.000	
3	0.269	0.265	0.018	0.001	
4	0.282	0.276	0.013	0.004	
5	0.288	0.280	0.006	0.050	
6	0.296	0.287	0.008	0.022	1.696

Coefficients

		Standardized Coefficients		Collinearity Statistics
Model		Beta	Sig.	Tolerance
1	(Constant)		0.000	
	WTI Growth	0.468	0.000	1.000

2	(Constant)		0.000	
	WTI Growth	0.471	0.000	1.000
	Tot. Value of Un-exercisable Options/TEC	0.179	0.000	1.000
3	(Constant)		0.543	
	WTI Growth	0.545	0.000	0.764
	Tot. Value of Un-exercisable Options/TEC	0.180	0.000	1.000
	US-GDP Growth	0.153	0.001	0.764
4	(Constant)		0.946	
	WTI Growth	0.550	0.000	0.763
	Tot. Value of Un-exercisable Options/TEC	0.179	0.000	1.000
	US-GDP Growth	0.153	0.001	0.764
	Revenue	-0.112	0.004	0.997
5	(Constant)		0.087	
	WTI Growth	0.541	0.000	0.755
	Tot. Value of Un-exercisable Options/TEC	0.175	0.000	0.997
	US-GDP Growth	0.154	0.001	0.764
	Revenue	-0.124	0.002	0.975
	Var. Pay/TEC	0.078	0.050	0.959
6	(Constant)		0.028	
	WTI Growth	0.542	0.000	0.755
	Tot. Value of Un-exercisable Options/TEC	0.178	0.000	0.996
	US-GDP Growth	0.163	0.000	0.759
	Revenue	-0.116	0.003	0.968
	Var. Pay/TEC	0.092	0.022	0.936
	Bonus/TEC	0.091	0.022	0.959

Dependent Variable: Rev. Growth

Source: Author's calculation and presentation

To conclude, it can be stated that compensation ratios only present a low explanatory power for defining the variance in revenue growth. Thus, structural characteristics of the compensation scheme have a small effect on quantitative business growth. One exogenous factor (WTI price growth) provides the bulk of the explanatory power, contributing almost 22% as mentioned. Again, the control of this variable does not fall within the power or discretion of executives.

The regression analysis on net income growth—including the same variables as for the TSR regression and the revenue growth regression—has not generated any viable regression model because none of the independent variables are correlated with net income growth at the 0.05 significance level. Therefore, it can be stated that none of the compensation ratios and control variables explain net income growth.

4.4.3 Management Activities and Firm Performance

The independent variables for the regression analysis on revenue growth are:

- all 22 indicators describing management activity and management efficiency (see Appendix B, 1a–1c),
- the control variables GDP growth (US GDP, World GDP), oil price growth (WTI), firm size, and CEO tenure (see Appendix B, 3).

The main results are (see Table 17):

- The regression provided seven models, all of which are viable models with TOL > 0.6, hence model 7 is the final model, and the Durbin Watson test denotes no autocorrelation,
- the final model shows a high explanatory power of 84% (adj. r2 = 0.836), and each predictor has a positive beta coefficient,
- the main predictor contributing the highest explanatory power (adj. r^2 = 0.581) is the oil and gas output growth, which thus explains 58% of the revenue growth variance,
- the WTI oil price growth impacts revenue growth variance by around 23% (adj. r^2 = 0.226),
- all other predictors add very little to the explanatory power.

To conclude, the increase in oil and gas output explains the bulk of the revenue growth variance: the higher the volume of oil and gas produced, the higher the volume-to-market delivered and, therefore, the revenue. Likewise, as expected, the oil price is also a strong predictor of revenue growth. Both findings show that oil and gas exploration and production companies are demand-supply adapters and price takers. The increase in their output changes with demand and they need to accept oil market prices. Quality leadership strategies or niche strategies

by targeting special customer segments do not appear to be viable strategic options for the management to generate firm growth. The emphasis is on the operational level and the focus on output growth as the main driver of firm growth.

Table 17 Management Activities and Management Efficiency Ratios/Revenue Growth Regression Models (N = 477)

Model Summary

Model	R Square	Adjusted R Square	Change Statistics		Durbin-Watson
			R Square Change	Sig. F Change	
1	0.582	0.581	0.582	0.000	
2	0.808	0.807	0.226	0.000	
3	0.817	0.816	0.009	0.000	
4	0.826	0.824	0.008	0.000	
5	0.831	0.829	0.006	0.000	
6	0.835	0.833	0.004	0.001	
7	0.839	0.836	0.004	0.001	1.943

Coefficients

Model		Standardized Coefficients		Collinearity Statistics
		Beta	Sig.	Tolerance
1	(Constant)		0.905	
	Oil & Gas Output Growth	0.763	0.000	1.000
2	(Constant)		0.135	
	Oil & Gas Output Growth	0.768	0.000	1.000
	WTI Growth	0.476	0.000	1.000
3	(Constant)		0.014	
	Oil & Gas Output Growth	0.712	0.000	0.750
	WTI Growth	0.469	0.000	0.995
	CAPEX/Deprec.	0.113	0.000	0.748
4	(Constant)		0.000	
	Oil & Gas Output Growth	0.707	0.000	0.749

	WTI Growth	0.519	0.000	0.762
	CAPEX/Deprec.	0.113	0.000	0.748
	US-GDP Growth	0.105	0.000	0.763
5	(Constant)		0.000	
	Oil & Gas Output Growth	0.692	0.000	0.727
	WTI Growth	0.522	0.000	0.761
	CAPEX/Deprec.	0.112	0.000	0.748
	US-GDP Growth	0.106	0.000	0.763
	Explor. & Evalu. Expend/OCF	0.076	0.000	0.960
6	(Constant)		0.000	
	Oil & Gas Output Growth	0.666	0.000	0.644
	WTI Growth	0.520	0.000	0.761
	CAPEX/Deprec.	0.091	0.000	0.689
	US-GDP Growth	0.107	0.000	0.763
	Explor. & Evalu. Expend/OCF	0.084	0.000	0.946
	Tot. Additions. less Sales	0.074	0.001	0.703
7	(Constant)		0.000	
	Oil & Gas Output Growth	0.674	0.000	0.636
	WTI Growth	0.524	0.000	0.759
	CAPEX/Deprec.	0.068	0.004	0.627
	US-GDP Growth	0.109	0.000	0.762
	Explor. & Evalu. Expend/OCF	0.083	0.000	0.945
	Tot. Additions. less Sales	0.074	0.001	0.703
	Purch. of. Non-Petro. PP & E/OCF	0.065	0.001	0.897

Dependent Variable: Rev. Growth

Source: Author's calculation and presentation

Concerning the effects of management activities and management efficiency on net income growth, the regression analysis provides no viable model because none of the predictors and control variables are correlated with net income growth at the 0.05 significance level. This implies that neither of the predictors representing management activities and management efficiency nor any of the included exogenous variables can explain the criterion. A potential explanation for this phenomenon is that net income growth follows a random path in the sense of the

stochastic theory (see Section 2.1.4), is determined by other non-included variables, or can only be explained by a complex interaction of multiple factors, none of which is significant or dominant. In each case, net income growth seems to be beyond the management's area of influence.

4.4.4 Management Activities/Management Efficiency and TSR (3 Years)

The independent variables for the regression analysis on the TSR are the same as in the case of the revenue growth regression and the net income growth regression and, additionally, revenue growth and net income growth. Only one variable was found as a significant predictor (see Table 18):

- five regression models were generated, of which Model 1 was the final model, as Model 2 already includes one variable with a TOL < 0.6, and the Durbin Watson test indicates a moderate autocorrelation,
- the final model shows a low explanatory power of 6.7% with the beta coefficient being positive,
- the CAPEX-to-PP&E ratio is the only viable predictor, which indicates that steady investment into oil and gas fields supports the TSR,
- revenue growth and net income growth do not drive the TSR,
- even Model 5 of the regression (not shown in Table 18 due to multicollinearity issues), including all significant management activities and management efficiency ratios, reaches an explanatory power of 13.3%, thereby indicating that 86.7% of the TSR variance must be explained by other (most likely exogenous) factors such as shareholder expectations which are beyond the managerial sphere of influence.

Table 18 Management Activities and Management Efficiency Ratios/TSR Regression Model (N = 477)

Model Summary

Model	R Square	Adjusted R Square	Change Statistics: R Square Change	Change Statistics: Sig. F Change	Durbin-Watson
1	0.069	0.067	0.069	0.000	1.453

Coefficients

Model		Standardized Coefficients: Beta	Sig.	Collinearity Statistics: Tolerance
1	(Constant)		0.000	
	CAPEX/PP & E	0.263	0.000	1.000

Dependent Variable: TSR (3 yr.) Equilar

Source: Author's calculation and presentation

4.5 Final Models

4.5.1 Final TSR (3 Years) Model

The final data analysis investigated the effects of management activities and remuneration policy on firm performance and examined the explanatory power of combined models by including each of the factors found in the respective partial regression analyses (see Table 19). Consequently, the regression on the combined (final) TSR block-wise entered all six predictors found in the regression of compensation ratios on the TSR (see Table 15) and in the regression of management activities and efficiency on the TSR (see Table 18). The first block comprises two compensation ratios, as these are the focus of this study (see Model 1 in Table 19). In a second step, the one management activity and efficiency indicator was entered into the model (see Model 2 in Table 19). Finally, the WTI price growth, the US GDP growth, and the World GDP growth were inputted stepwise as control variables.

The final model explains 11.3% of the TSR variance, whereby the compensation predictors block contributes 3.2% and the management activities block 5.8% to the explanatory power. The WTI growth adds 1.5% and the US GDP growth 0.8%, while the World GDP growth has no impact on the criterion.

Table 19 Final (Combined) TSR (3 yr.) Model (N = 477)

Model Summary

Model	R Square	Adjusted R Square	Change Statistics: R Square Change	Change Statistics: Sig. F Change	Durbin-Watson
1	0.036	0.032	0.036	0.000	
2	0.095	0.090	0.060	0.000	
3	0.113	0.105	0.018	0.002	
4	0.123	0.113	0.010	0.023	1.484

Coefficients

Model		Standardized Coefficients: Beta	Sig.	Collinearity Statistics: Tolerance
1	(Constant)		0.000	
	Var. Pay/TEC	0.175	0.000	0.976
	Bonus/TEC	0.102	0.025	0.976
2	(Constant)		0.000	
	Var. Pay/TEC	0.158	0.000	0.971
	Bonus/TEC	0.072	0.105	0.962
	CAPEX/PP & E	0.247	0.000	0.983
3	(Constant)		0.000	
	Var. Pay/TEC	0.141	0.002	0.956
	Bonus/TEC	0.068	0.124	0.961
	CAPEX/PP & E	0.250	0.000	0.982
	WTI Growth	0.134	0.002	0.984
4	(Constant)		0.000	
	Var. Pay/TEC	0.146	0.001	0.954
	Bonus/TEC	0.077	0.080	0.953
	CAPEX/PP & E	0.241	0.000	0.974
	WTI Growth	0.188	0.000	0.758
	US-GDP Growth	0.114	0.023	0.753

Dependent Variable: TSR (3 yr.) Equilar

Source: Author's calculation and presentation

The final model shows no multicollinearity issues, and none of the variables exhibit tolerance values less than 0.6. The Durbin-Watson test shows a moderate autocorrelation level. Therefore, the final TSR model exhibits a relatively high model quality. However, akin to the partial models for both indicator groups, the final TSR model only provides a modest explanatory power with 88.7% of the TSR variance unexplained, which implies that other exogenous factors (such as shareholder expectations) most likely have a stronger effect on the TSR. Thus, it can be stated that the complete set of factors that represent the compensation structure, and the management activities and efficiency explain the absolute TSR to a limited extent only.

4.5.2 Final Revenue Growth Model

The final data analysis concerning the effects of management activities and management efficiency, and the remuneration policy effectiveness on firm performance in terms of revenue growth examined the explanatory power of both partial models by including each factor found as relevant in both revenue growth regression analyses. Consequently, the regression to generate the final (integrated) revenue growth model block-wise enters all 13 predictors found in the regression analysis of the compensation ratios (see Table 16) and the regression analysis of management activities and management efficiency (see Table 17). As in the final TSR model, three compensation ratios were entered as the first block, followed by five management activity variables as the second block. The control variables WTI price growth, US GDP growth, and revenue were entered stepwise thereafter. In contrast to the final TSR model, the final revenue growth model provides a very strong explanatory power of around 84% (see Table 20).

The model's quality can be defined as high, with a Durbin-Watson value of close to 2 and all predictors having a TOL > 0.6. Thus, the final revenue growth model exhibits no collinearity and autocorrelation issues and only revenue as a control variable shows no significance. Therefore, revenue as a proxy for firm size—entered in the last step (see Model 4)—was excluded from the final model due to its explanatory power of zero.

The final revenue growth model is dominated by the management activities block that produces an explanatory power of 56.3%, and the WTI price growth as a

control variable adds another 21.8%. The compensation ratio block contributes only 4.8%, and the US GDP growth contributes virtually nothing.

Table 20 Final (Combined) Revenue Growth Model (N = 477)

			Change Statistics		
Model	R Square	Adjusted R Square	R Square Change	Sig. F Change	Durbin-Watson
1	0.054	0.048	0.054	0.000	
2	0.617	0.611	0.563	0.000	
3	0.832	0.829	0.214	0.000	
4	0.842	0.838	0.010	0.000	1.933

Coefficients

		Standardized Coefficients		Collinearity Statistics
Model		Beta	Sig.	Tolerance
1	(Constant)		0.067	
	Tot. Value of Un-exercisable Options/TEC	0.170	0.000	0.997
	Var. Pay/TEC	0.134	0.003	0.974
	Bonus/TEC	0.103	0.023	0.975
2	(Constant)		0.000	
	Tot. Value of Un-exercisable Options/TEC	0.020	0.506	0.927
	Var. Pay/TEC	0.087	0.004	0.927
	Bonus/TEC	0.030	0.323	0.908
	Oil & Gas Output Growth	0.642	0.000	0.636
	CAPEX/Deprec.	0.096	0.009	0.611
	Explor. & Evalu. Expend/OCF	0.084	0.005	0.918
	Tot. Additions. less Sales	0.093	0.007	0.686
	Purch. of non-Petrol. PP & E/OCF	0.033	0.288	0.869
3	(Constant)		0.011	
	Tot. Value of Un-exercisable Options/TEC	0.035	0.074	0.926
	Var. Pay/TEC	0.029	0.151	0.914

	Bonus/TEC	0.018	0.356	0.907
	Oil & Gas Output Growth	0.677	0.000	0.634
	CAPEX/Deprec.	0.060	0.013	0.609
	Explor. & Evalu. Expend/OCF	0.084	0.000	0.918
	Tot. Additions. less Sales	0.068	0.003	0.685
	Purch. of non-Petro. PP & E/OCF	0.062	0.003	0.866
	WTI Growth	0.469	0.000	0.976
4	(Constant)		0.000	
	Tot. Value of Un-exercisable Options/TEC	0.037	0.052	0.925
	Var. Pay/TEC	0.033	0.085	0.912
	Bonus/TEC	0.027	0.164	0.901
	Oil & Gas Output Growth	0.671	0.000	0.633
	CAPEX/Deprec.	0.057	0.016	0.609
	Explor. & Evalu. Expend/OCF	0.087	0.000	0.917
	Tot. Additions. less Sales	0.069	0.002	0.685
	Purch. of non-Petro. PP & E/OCF	0.063	0.002	0.866
	WTI Growth	0.523	0.000	0.752
	US-GDP Growth	0.113	0.000	0.756

Dependent Variable: Rev. Growth

Source: Author's calculation and presentation

As the oil and gas output growth is the strongest predictor to explain revenue growth, it was further examined which variables best explain oil and gas output growth if this indicator is used as a dependent variable. Hence, the capital allocation ratios, capital structure variables, and the E&P operations indicators (see App. B, 1b-1c) were inserted into the model as independent variables, whereby a strong and valid final model was generated (see Table 21).

Table 21 Oil & Gas Output Growth Model (N = 477)

Model Summary

Model	R Square	Adjusted R Square	Change Statistics: R Square Change	Change Statistics: Sig. F Change	Durbin-Watson
1	0.385	0.384	0.385	0.000	
2	0.480	0.478	0.095	0.000	
3	0.488	0.484	0.008	0.008	
4	0.492	0.488	0.005	0.034	1.877

Coefficients

Model		Standardized Coefficients: Beta	Sig.	Collinearity Statistics: Tolerance
1	(Constant)		0.000	
	CAPEX/PP & E	0.621	0.000	1.000
2	(Constant)		0.000	
	CAPEX/PP & E	0.507	0.000	0.880
	Proven Oil & Gas Reserves Growth	0.328	0.000	0.880
3	(Constant)		0.000	
	CAPEX/PP & E	0.493	0.000	0.860
	Proven Oil & Gas Reserves Growth	0.326	0.000	0.880
	Explor. & Evalu. Expend/OCF	0.089	0.008	0.971
4	(Constant)		0.000	
	CAPEX/PP & E	0.508	0.000	0.825
	Proven Oil & Gas Reserves Growth	0.334	0.000	0.870
	Explor. & Evalu. Expend/OCF	0.100	0.003	0.947
	Tot. Investing Activities/OCF	-0.074	0.034	0.892

Dependent Variable: Oil & Gas Output Growth

Source: Author's calculation and presentation

The forward stepwise regression generated four models that all fulfill the quality requirements concerning multicollinearity and autocorrelation and for which the predictors explain 48.8% of the variance in production growth. The final model (Model 4) indicates that the CAPEX-to-PP&E ratio alone explains 38.4% of the oil and gas reserve growth variance. This confirms the results of the PIMS studies as heavy investment increases revenue but also has a negative effect on the ROI due to the emphasis placed on procuring high volumes and hence high-capacity utilization (Schoeffler et al., 1974, pp. 11–12). The E&P business is a very capital-intensive business and usually achieves low ROIs. The proven oil & gas reserves growth is also important, as it contributes 9.4% to the variance of the criterion. The other predictors are negligible for the explanatory power.

All independent variables except total investing activities/OCF show positive betas, which indicates that their increase has a positive impact on the criterion. The dominating predictor is the CAPEX/PP&E ratio, which enables the expansion of oil and gas facilities, while the oil and gas output growth as the other important predictor caters for sustainable development of the oil and gas production.

4.6 Differences of TSR (3 Years) Performance Groups

The regression models that are shown above only produce a strong model for explaining revenue growth, but for net income growth as a dependent variable, no meaningful model could be generated. As for the TSR, relatively weak models were developed. However, since the TSR is the main key performance measure in the shareholder value concept, this indicator was further examined by analyzing group differences. For this purpose, the t-Test was applied to analyze the differences of companies with an above-median TSR (3 years) of -0.05 (-5%) with companies showing a TSR below the median (see Table 22).

As mentioned in the descriptive statistics and in the discussion of the final TSR regression model, it can be assumed that the average oil and gas exploration and production company is—compared to many other industries—not a very profitable investment case from the financial market perspective. As mentioned, this becomes obvious in the descriptive statistics, as the median TSR (3 years) is negative.

The t-Test examines both groups of companies by using:

- selected management activity and management efficiency variables,
- selected compensation ratios,
- revenue growth,
- and CEO tenure as a control variable.

Table 22 Significant Management Activity, Compensation Structure, and Revenue Growth Differences in the TSR Groups

		Levene's Test for Equality of Variances	t-test for Equality of Means	Group Statistics		
				TSR (3 yr)	N	Mean
D / E Ratio	Equal var. assum.	0.000	0.001	>= -.05	241	0.46
	Equal var. not assum.		0.001	< -.05	236	1.25
ROA	Equal var. assum.	0.006	0.000	>= -.05	241	0.07
	Equal var. not assum.		0.000	< -.05	236	0.05
ROS	Equal var. assum.	0.000	0.024	>= -.05	241	0.20
	Equal var. not assum.		0.025	< -.05	236	0.28
CAPEX / Rev.	Equal var. assum.	0.001	0.000	>= -.05	241	1.02
	Equal var. not assum.		0.004	< -.05	236	0.79
CAPEX / Deprec.	Equal var. assum.	0.000	0.000	>= -.05	241	2.81
	Equal var. not assum.		10277319.161	< -.05	236	1.87
CAPEX / PP & E	Equal var. assum.	0.000	0.000	>= -.05	241	0.17
	Equal var. not assum.		0.000	< -.05	236	0.11
Rev. Growth	Equal var. assum.	0.153	0.000	>= -.05	241	0.32
	Equal var. not assum.		0.000	< -.05	236	0.07
CAPEX Growth	Equal var. assum.	0.020	0.004	>= -.05	241	0.57
	Equal var. not assum.		0.004	< -.05	236	0.09
Oil & Gas Output Growth	Equal var. assum.	0.000	0.000	>= -.05	241	0.31
	Equal var. not assum.		0.000	< -.05	236	0.11
Purch. o. Non-Petro. PP & E / OCF	Equal var. assum.	0.000	0.024	>= -.05	241	0.04
	Equal var. not assum.		0.023	< -.05	236	0.02
Purch. o. Non-Petro. PP & E / CAPEX	Equal var. assum.	0.001	0.037	>= -.05	241	0.02
	Equal var. not assum.		0.036	< -.05	236	0.01
Proven Oil & Gas Reserv./Production (years)	Equal var. assum.	0.362	0.194	>= -.05	241	14.79
	Equal var. not assum.		0.195	< -.05	236	13.66

Base Salery / TEC	Equal var. assum.	0.075	0.000	>= -.05	241	0.10
	Equal var. not assum.		0.000	< -.05	236	0.16
NEIP / TEC	Equal var. assum.	0.221	0.005	>= -.05	241	0.08
	Equal var. not assum.		0.005	< -.05	236	0.11
Value Realized on Exercise / TEC	Equal var. assum.	0.000	0.002	>= -.05	241	0.02
	Equal var. not assum.		0.002	< -.05	236	0.00
Tot.Value of Exercis. Options / TEC	Equal var. assum.	0.000	0.000	>= -.05	241	0.04
	Equal var. not assum.		0.000	< -.05	236	0.01
Tot. Value of Unexercis. Options / TEC	Equal var. assum.	0.000	0.000	>= -.05	241	0.12
	Equal var. not assum.		0.000	< -.05	236	0.04
LTIP /STIP	Equal var. assum.	0.030	0.005	>= -.05	240	12.17
	Equal var. not assum.		0.005	< -.05	236	8.38
Fix. Pay/LTIP	Equal var. assum.	0.000	0.003	>= -.05	241	0.14
	Equal var. not assum.		0.004	< -.05	236	0.30
Fix Pay/Var. Pay	Equal var. assum.	0.000	0.005	>= -.05	241	0.12
	Equal var. not assum.		0.006	< -.05	236	0.32
TCP/TEC	Equal var. assum.	0.092	0.000	>= -.05	241	0.21
	Equal var. not assum.		0.000	< -.05	236	0.29
Var. Pay/TEC	Equal var. assum.	0.023	0.000	>= -.05	241	0.89
	Equal var. not assum.		0.000	< -.05	236	0.82
LTIP/TEC	Equal var. assum.	0.045	0.000	>= -.05	241	0.78
	Equal var. not assum.		0.000	< -.05	236	0.68

Source: Author's calculation and presentation. Higher mean values are marked.

A total of 23 variables showed significant group differences in their mean values. Concerning the CEO tenure, it was found that the duration of the CEO's service is not a distinctive characteristic of non-performing or performing companies, and hence this variable is not contained in Table 22.

Table 23 summarizes the business performance indicators that show a higher mean for the below-median group, labeled as negative indicators, while Table 24 displays the business performance indicators with a higher mean for the above-median group, labeled as positive indicators. Based on these, recommendations for the remuneration policy were developed.

Table 23 Negative Business Performance Indicators for TSR Performance

Indicator	Comment
Debt-Equity Ratio (Leverage)	– Companies with a lower TSR performance show substantially higher leverage. Because of the low margins in this sample's companies, it can be assumed that predominant debt financing is not a productive option. – Therefore, lower leverage should be incentivized.
ROS	– The ROS is calculated as the net income divided by revenue. The question arises why TSR underperformers show a higher ROS. A reason could be that such companies spend less on exploration and production than better-performing companies, as especially companies with an aggressive strategy achieve lower returns in the expansion phase, while not yet realizing higher revenues. – Based on this speculative finding, it can be assumed that the ROS may be helpful as a management controlling indicator but is not appropriate for structuring a performance-based incentive system.

Source: Author's presentation

Positive business indicators are indicators that show higher mean values of the TSR-performer group, which suggests that the increase of the respective factor should be targeted to increase the TSR.

Table 24 Positive Business Performance Indicators for TSR Performance

Indicator	Comment
ROA	– The TSR performer group shows an average ROA of 7% and the TSR underperformer group of 5%. This indicates that the executives of TSR performers use the firm's assets more effectively. – Despite the small difference between both groups, the ROA can be considered relevant for structuring a compensation plan.
CAPEX/Revenue	– The TSR underperformer mean value shows that these companies invest less than they generate by sales activities. In contrast, TSR performers invest about the level of their revenues. – The unusually high investment is obviously a consequence of the quest for growth in the wake of the shale oil and shale gas boom in North America during the observation period of this thesis. Shareholders provided enough capital for this extraordinary growth. Consequently, it can be said that CAPEX growth and, its ratio to revenue, in particular, is a success-relevant management performance indicator to be used in structuring the compensation plan.
CAPEX/Depreciation	– TSR performers invest almost three times the level of depreciation, TSR underperformers roughly twice. – It is to be assumed that, for a sustainable TSR performance, the investment into production capacity should be higher than two times the value of the company's write-offs. – Consequently, management performance monitoring and the executive compensation plan should measure and incentivize a respective investment activity.

Indicator	Comment
CAPEX/PP&E	– The CAPEX-to-PP&E ratio reflects the ratio between the annual investment into production capacity and the book value of the existing PP&E (gross PP&E). – The mean values of both groups indicate that TSR performers invest an amount in their capacity expansion that equals 17% of the PP&E book value, while TSR underperformers invest only 11%. – Based on this finding, the CAPEX/PP&E ratio should also be considered as a component in management controlling and compensation plan structuring, particularly because the TSR regression models have provided a cause-effect relationship with the CAPEX/PP&E ratio (see Tables 18 and 19).
Revenue Growth	– The TSR performer's average revenue growth accounts for 32% p. a. and the TSR underperformer's average only for 7% p.a. – However, as the TSR regression model has not provided evidence for revenue growth as a TSR driver, revenue growth should not be part of a compensation plan, although it should nonetheless be a highly relevant management controlling and reporting component.
CAPEX Growth	– Capex Growth of TSR performers is 48 percentage points higher than for TSR underperformers. – Consequently, as is the case with the three other CAPEX ratios discussed, CAPEX growth should be considered as an element of a compensation plan.
Oil & Gas Output Growth	– The TSR performer group shows a nearly threefold higher output growth than the TSR underperformers. – However, as the output growth is essentially the result of CAPEX/PP&E and oil & gas reserves growth (see Table 21), this variable is a result of preceding management activities, being an outcome indicator resulting from other input factors. – Consequently, the output growth seems to be inappropriate as a performance measure but is an important information element in a management controlling report.

Indicator	Comment
Purchase of Non-Petroleum PP&E/OCF	– The purchase of non-petroleum PP&E represents the investments in corporate assets other than upstream oil and gas assets in relation to the operational cash flow. – However, the mean difference between both groups is small, so this variable cannot be considered as a relevant TSR driver and, therefore, also not as a relevant controlling component or compensation plan indicator.
Purchase of Non-Petroleum PP&E/CAPEX	– As in the preceding case, the mean difference between both groups is small, so this indicator is not a relevant TSR driver and, therefore, also not a relevant controlling component or compensation plan measure.
Total Oil and Gas reserves/Oil & Gas Output	– This is slightly higher for the TSR performers, however, as it is a very important indicator for the longevity and sustainable performance of E&P companies, it should be a measure for a compensation plan.

Source: Author's presentation

A total of 11 compensation ratios showed significant differences between the two groups (see Table 25), including eight variables representing a share of a compensation component in the TEC (total executive costs).

Table 25 Significant Compensation Ratios

Indicator with a higher mean value in the TSR performer group (positive indicator)	Indicator with a lower mean value in the TSR performer group (negative indicator)
(1) Value Realized on Exercise/TEC	(1) Base Salary/TEC
(2) Total Value of Exercisable Options/TEC	(2) NEIP/TEC
(3) Total Value of Un-exercisable Options/TEC	(3) Fix. Pay/LTIP
(4) LTIP/STIP	(4) Fix. Pay/Var. Pay
(5) Var. Pay/TEC	(5) TCP/TEC
(6) LTIP/TEC	

Source: Author's presentation

The TSR performer group shows higher shares of

- the value realized on exercise in the total executive cost,
- the total value transferred as exercisable and un-exercisable options in the total executive cost.

Moreover, the TSR performer group shows

- a higher share of the LTIP in relation to STIP,
- a higher share of variable pay in the total executive cost, and
- a higher share of the LTIP in the total executive cost.

In contrast, the TSR underperformers have higher shares of non-equity payments (base salary, non-equity incentive plan, total cash payment) in relation to total

executive cost, and they also prefer fixed pay referring to the LTIP and variable pay.

To summarize the findings concerning the significant compensation ratios, it can be stated that TSR underperformers incentivize short-term and fixed parts of compensation and are quite restrained concerning long-term and variable elements of pay.

In contrast, the TSR performers clearly focus on long-term and variable pay—which are essentially equity components—and thus performance-related compensation parts.

5. Discussion and Conclusions

This thesis examined the question of whether good management performance and well-structured compensation plans can promote firm performance in the US and Canadian E&P industry. The investigation determined which activities on the part of the managers have an impact on firm performance, which compensation plan designs and remuneration policies stimulate firm performance, what the differences are between well-performing and poorly performing companies concerning compensation characteristics and management activities, and whether CEOs in this industry are paid for luck or performance. Chapter 1 defined the study as not only attempting to determine cause-effect relationships but also as searching for compensation plan and management activities' differences between groups with varying business performance. Both aims were addressed in the research questions:

- RQ1: Can management compensation plan characteristics and remuneration policy efficiency explain E&P companies' performance?
- RQ2: Can management activities and management efficiency explain the performance of E&P companies?
- RQ3: What are the differences between performing and non-performing E&P companies concerning their management activities and management efficiency as well as their compensation plan characteristics?

Section 5.1 provides the answers to these research questions by discussing the results of the data analyses. Section 5.2 draws conclusions from the discussion of the data analyses results by triangulation, by referring to the literature discussed in the research framework and the remuneration policy practice, while Section 5.3 alludes to the limitations of this thesis and the outlook on further research.

5.1 Data Analyses Resume

The data analyses' results can be summarized by four general findings:

(1) No general evidence was found for size effects on the compensation plan structure measured by several different ratios representing the compensation plan component mix and the remuneration policy efficiency. It can, therefore, be concluded that the compensation plan structure and its efficiency (remuneration policy efficiency) is independent of firm size. However, the absolute level of compensation varies with firm size in terms of revenue. This can be considered as the usual pay-for-size effect, as larger companies usually can afford to pay a higher CEO compensation than smaller companies.

(2) The firm performance regression models – including a set of compensation ratios as predictors – yielded only small causal effects on firm performance in terms of TSR and revenue growth. As for net income growth, no viable regression model was generated as none of the compensation ratios could explain net income growth. Thus, it can be concluded that the existing compensation plans of the sample companies show a limited remuneration policy efficiency.

(3) The firm performance regression models that include a set of management activities as predictors indicated a strong causal effect on firm performance in terms of revenue growth and a low effect regarding the TSR. This leads to the conclusion that selected management activities have a considerable impact on the quantitative growth of E&P companies, whereas such activities can promote the TSR to a modest degree only. Again, concerning net income growth as an indicator of qualitative growth, no viable regression model could be generated.

(4) The t-Test analysis of TSR performance groups shows significant differences between non-performing and performing companies, which facilitated the identification of indicators that can be used in the structuring of compensation schemes (see Tables 23–25).

Concerning the findings of the descriptive statistics regarding firm performance and compensation, the following essentials were observed (see Table 26):

Table 26 Essentials of the Descriptive Statistics Results (see Table 11, all data 2018) and Section 4.1

Topic	Result
Firm Profitability	– Negative net income growth (Mean -80%, Median -27%), low efficiency of capital employed (ROCE Mean 7%, Median 5%)
Firm Value and Size Growth	– Good Mean TSR (3yr) of 7% but weak Median TSR (3yr) of -5%, very high Mean (39%), and Median revenue growth (36%)
Compensation	– Mean base salary USD 0.653m, Median USD 0.575m – Mean NEIP USD 0.924m, Median USD 0.679m – Mean value realized on vesting of shares USD 2,388m, Median USD 0.997m – Mean total value realized USD 2,614m, Median USD 1,042m – Mean total value of unvested shares USD 2,067m, Median 0.666m – Mean total value of unvested IP shares USD 3,887m, Median USD 1,532m – Mean total executive compensation USD 10,669m, Median 5,370m
Firm & Compensation	– Total executive costs (sample) = USD 906.9m – TEC is 0.32% of the sample's total revenue of USD 281bn
Management	– Mean CEO tenure 6.6 years, Median 4.7 years

Source: Author's presentation

(1) The average E&P company features a good mean TSR performance and a very high revenue growth rate,

(2) the return ratios are rather low, which confirms the results of the PIMS studies as high investment negatively impacts the ROI,

(3) on average, CEOs hold short periods of service (CEO tenure),

(4) the compensation mix models are diverse with a few paying no base salary or bonus. More than half of the companies pay no (discretionary) bonus, but the majority pay an annual incentive in the form of a non-equity incentive plan and some sort of long-term incentive plan,

(5) the total executive cost of the sample amounts to a very small portion of the sample's total revenue (0.32 %).

The findings concerning the firm size effects and compensation plan structure can be summed up as follows (see Table 27):

(1) Based on the bivariate regression analysis of the firm size and compensation data, it can be concluded that the compensation structure is independent of the company's firm size, while the total payout has a medium correlation with firm size,

(2) direct cash payment accounts for a relativity small share of the total value transfer from the firm to the agent,

(3) the bulk of the value is transferred to CEOs by unvested IP shares,

(4) generally, long-term incentive payment massively outweighs short-term incentive payment.

Table 27 Results Concerning Firm Size and Other Compensation Structure Characteristics (see Sections 4.2 and 4.3)

Topic	Result
Firm Size & Amount of Payment	– Firm size strongly affects the amount of the base salary, the correlations with total cash payments, NEIP, STIP, TEC, LTIP, and Other Compensation are medium
Firm Size & Compensation Mix/Policy	– Firm size does not determine the compensation mix and remuneration policy efficiency
Compensation Structure	– Value transferred by the total value of unvested IP shares, the value realized on vesting of shares, and the total value of unvested shares considerably exceed the base salary and non-equity incentive plan payouts – The LTIP-to-STIP ratio (mean) is 7.5:1

Source: Author's presentation

The multiple regression analyses generating partial models deliver the following findings (see Table 28):

(1) Concerning the compensation ratios and their effect on the TSR, it was found that two compensation-related ratios explain the TSR variance, albeit to a very small extent only.

(2) The same outcome applies to management activity and management efficiency ratios, whereby one predictor was again found to be significant but also only provided a low explanatory power.

(3) In contrast, the revenue growth performance regression shows different results—while the compensation ratios only showed low explanatory levels, the management activity ratios produced a strong model.

(4) Regarding net income growth, no viable regression model could be developed. This may be the result of a large dispersion of net income growth

values, which indicate a strong random distribution and thus reduce the likelihood of strong models (see Sections 4.4.2 and 4.4.3).

Converging the results for the partial models, the final revenue growth model presents a strong explanatory power, while the final TSR model remains moderate.

Referring to the firm growth models discussed in Section 2.1, it can be concluded that—besides net income growth—the performance of TSR must also be considered as a stochastic process (particularly as the TSR can be explained by business performance indicators to a limited extent only), while the revenue growth can be explained by a strong model based on management activities and on market price (WTI price growth). It can be assumed that revenue growth follows a market-based model of firm growth as can be seen in Tables 16 and 17 since the US GDP growth represents a certain, albeit small, element as an explanatory factor. Economic growth drives oil demand and mobilizes the internal resources of companies to increase oil and gas output. These results also allow the assertion that E&P companies are largely demand-driven price takers, as their revenue growth largely depends on the global oil and gas demand and cannot be increased by following any of Porter's generic strategies. This indicates the low scope for an active price policy because the oil price is determined by the market and cannot be influenced by individual companies.

Table 28 Firm Performance Predictors

Regression Model	*Included Predictors (Coefficient Sign)*	*Explanatory Power*
Partial Models for TSR (see Tables 15 and 18)		
Compensation Ratios to TSR	(1) Variable Pay/TEC (+) (2) WTI Growth (+) (3) US GDP Growth (+) (4) Bonus/TEC (+) (5) World GDP Growth (-)	7%
Management Activities & Efficiency Ratios to TSR	(1) CAPEX/PP & E (+)	7%
Partial Models for Revenue Growth (see Tables 16 and 17)		
Compensation Ratios to Revenue Growth	(1) WTI Growth (+) (2) Total Value of Un-exercisable Options/TEC (+) (3) US GDP Growth (+) (4) Revenue (-) (5) Variable Pay/TEC (+) (6) Bonus/TEC (+)	29%
Management Activities & Efficiency Ratios to Revenue Growth	(1) Oil & Gas Output Growth (+) (2) WTI Growth (+) (3) CAPEX/Depreciation (+) (4) US GDP Growth (+) (5) Exploration & Evaluation Expenditure/OCF (+) (6) Total Additions less Sales (+) (7) Purchase of non-PP & E/OCF (+)	84%

Final Performance Models (TSR & Revenue Growth) (see Tables 19 and 20)

Final Revenue Growth Model	(1) Total Value of Un-exercisable Options/TEC (+) (2) Variable Pay/TEC (+) (3) Bonus/TEC (+) (4) Oil & Gas Output Growth (+) (5) CAPEX/Depreciation (+) (6) Exploration & Evaluation Expenditure/OCF (+) (7) Total Additions less Sales (+) (8) Purchase of non-PP & E/OCF (+) (9) WTI Growth (+) (10) US GDP Growth (+)	84%
Final TSR Growth Model	(1) Variable Pay/TEC (+) (2) Bonus/TEC (+) (3) CAPEX 7 PP&E (+) (4) WTI Growth (+) (5) US GDP Growth (+)	11%

Source: Author's presentation, Note: + = positive relationship

Concerning the pay-for-performance link, it could be observed that:

- The TSR can essentially neither be explained by the compensation ratios nor the CEO management activities. Instead, a variety of exogenous factors are to be supposed, which leads to the conclusion that most of these factors are beyond the CEO's area of control. Hence, there is the assumption that CEOs are—regarding the absolute TSR as success factor—rather paid for luck than for performance, which essentially supports the findings of the pay-for-performance research in the oil industry discussed in Section 2.3.3 (Bertrand & Mullainathan, 2001; Davis & Hausman, 2018; Shang et al., 2020).
- In contrast, the business performance in terms of revenue growth can be considered as largely in the CEO's area of control, even though the industry-specific economics show that E&P companies essentially depend on

the market and, to a lesser extent, on a grand design of strategic management. The CEO's main task is focused on continuously adjusting resources to ensure that the shifting market demand can be satisfied. However, the compensation ratios (see Table 20) that were found to have a significant revenue growth effect, only increased the explanatory power of the final model by 5%, so that it could be deduced that—despite the strong effect of resource allocation activities, which are in the CEO's area of control—the pay-for-performance link is not well established, and that the remuneration policy efficiency must be considered as being low.

The findings for revenue growth allow for designing models of firm growth that mainly follow the industrial economics as discussed in Section 2.1.6, by looking at the firm as a price-volume adjusting vehicle, which is the nature of oil and gas firms in general and E&P firms in particular.

The final revenue growth model (see Table 20) presents the 10 revenue growth determinants that explain the revenue growth variance to 84%. The dominant variables are the oil and gas output growth and the WTI price growth, and the compensation ratios contribute little to the explanatory power.

As mentioned, the oil and gas output growth is the main revenue growth driver, which, in turn, can also be explained to a great degree by two other drivers: (1) the CAPEX-to-PP & E ratio and (2) the proven oil and gas reserves growth.

The findings concerning the relationship between revenue growth and the CAPEX-to-PP & E ratio follow the observations of industry analysts. Thus, for example, Johnson (2019, pp. 3, 9) showed that among the global oil companies, some use an anticyclical CAPEX increase in case of decreasing oil demand and return on capital employed to build up the capacities for short- to mid-term growth, while most companies follow the oil demand in their investment activities, which usually affects the stock quotes of the respective company.

The relationships between CAPEX, PP & E, and oil and gas reserves growth can be considered as intuitively logical:

- In an industry that follows the classic industrial economics in terms of the firm being the price taker and where management's main activity is adjust-

ing the production capacity to satisfy demand while continuously observing the costs of production to generate a positive margin, growth can only be realized by continuously increasing the production capacities.

- In the oil and gas exploration and production industry, this entails, in the first place, a continuous expansion of oil and gas reserves and continuous investment of large portions of the total investment into new production drilling and related facilities.
- However, following the empirical findings, the most relevant management activity is the expansion of drilling and extraction in both developed and undeveloped oil and gas fields, while the exploration and evaluation of new resources do not need to be proportional to these expansion activities. It can be assumed that the average exploration and production company can manage a demand increase (even for a longer period) mainly by improving oil/gas recovery and production optimization of existing fields.

To sum up the discussion of results so far, it can be ascertained that performance in the form of a capital market-oriented indicator (TSR) can only be explained by the predictors used to a limited extent. On the other hand, business performance can be explained very well with the available data, leading to a strong model. Thus, the final revenue growth model leaves only 16% of the variance unexplained, whereas the final TSR model leaves 89% unexplained. This means that the terms of the error in the regression equation (see Section 3.5.1) for the TSR models are substantially larger than in the revenue growth models.

To shed additional light on the TSR as an important market indicator, differences among TSR performance groups have been explored. The t-Test findings allow the conclusion that there is generally not one best way to structure executive compensation plans but that some indicators should be used to monitor executive performance and some of them should also be a compensation plan component (see Table 29).

Table 29 KPIs and Targets for TSR Increase

Indicator	Incentive Target
Debt-Equity Ratio (Leverage)	Decrease
ROA	Increase
CAPEX/Revenue	Increase
CAPEX/Depreciation	Increase
CAPEX/PP&E	Increase
CAPEX Growth	Increase

Source: Author's presentation

Therefore, management controlling and reporting should include these KPIs, and compensation plans should be linked with them. However, for the bulk of the companies in the sample, the TSR is a key target for compensation. Table 22 provides evidence that companies with a higher TSR (TSR performers) show a mean of 1.02 for the CAPEX/revenue ratio which indicates that their annual capital expenditures roughly equal their revenues, whereas the TSR underperformers exhibit a ratio of 0.79 for this KPI. Table 22 also shows high leverage for the TSR underperformers, with a mean value of 1.25 while the TSR performers only exhibit a mean of 0.46. These findings indicate that good TSR performers—whilst heavily investing in expanding their business—simultaneously pursue a prudent financing strategy. The opposite is true for TSR underperformers which are, to a large extent, dependent on outside capital thereby incurring a huge debt load.

In fact, TSR underperformers are obviously considered as a risky investment proposition by shareholders, which may partially explain the lower TSR as a consequence of the market's perception regarding the risk of high leverage.

A large number of the companies in the sample have made use of the readiness of shareholders to invest in E&P, and the low interest rates during the observation period of this thesis have also led to excessive CAPEX increases as a basis for expansion beyond sustainable and reasonable risk management which particularly applies to fracking companies. Therefore, it did not come unexpectedly that

some of the sample's companies—such as Whiting Petroleum Corp., Unit Corp., Extraction Oil & Gas Inc., and Chesapeake Energy Corp.— filed for bankruptcy in the wake of the oil price collapse in 2020 (Haynes & Boone, 2020, p. 7).

These findings clearly demonstrate the relevance of only using both KPIs—leverage and the CAPEX to revenue ratio (see Table 29)—in a systematic and combined way for compensation performance design. To prevent hazardous effects, both indicators need the linkage with long-term incentive components as the findings in Table 25 show: TSR-performers definitively prefer long-term incentives over short-term components.

Based on these outcomes, the research questions can be answered as follows:

- RQ1 asks whether management compensation plan characteristics and remuneration policy efficiency can explain firm performance. Here, the results of this thesis give reason to conclude, in the case of the E&P industry, that compensation plans and remuneration plan efficiencies must be questioned, particularly concerning the preference for net income growth and the TSR as performance indicators (see Figs. 11 and 19).
- RQ2 asks whether management activities and management efficiency can explain firm performance. In the case of revenue growth, the data analysis provided a strong deterministic model, which demonstrates that the main drivers of revenue growth result from managerial activities, while net income growth and TSR development can be considered the result of a stochastic process which makes it impossible to explain it by means of ordinary factor models.
- RQ3 asks for differences—in terms of management activities and management efficiency as well as compensation plan characteristics between companies with good and weak performance. This question can be answered by the KPIs shown in Tables 23–25.

Thus, the appropriateness of the absolute TSR as a performance target and a basis for pay-for-performance plan design in the E&P industry remains to be discussed in the subsequent section.

5.2 Conclusions and Governance Recommendations

To sum up the discussion concerning the pay-for-performance effectiveness and, thus, the remuneration policy efficiency and the TSR as the core indicator of the shareholder value discourse, it can be noted that:

- the TSR to compensation ratios regression model shows that the prevailing compensation plans can be considered ineffective, as they do not present more than modest effects of compensation ratios on the TSR,
- likewise, the TSR to management activities/management efficiency model demonstrates that CEOs, by virtue of their performance, can only impact the TSR to a limited extent; it was therefore concluded in the discussion of the empirical results that CEOs rather tend to receive a pay for luck, as they cannot control the factors driving the TSR.

In contrast to the TSR findings, the data provided a strong revenue growth model comprising factors within the CEO's area of control and certain components of the compensation plan.

Thus, it must be clearly stated that the absolute TSR is not a viable performance indicator for the E&P industry. Furthermore, the relative TSR is also sub-optimal, as this KPI is a result of the potentially arbitrary selection of the peer group and can reward executives for a better performance relative to that of their peers despite a weak share price development.

As discussed in Section 2.3.2.2, the study of Reda (2018) showed significant differences in the energy industry compared to all other industries concerning the use of the KPIs for the compensation plan design:

- The energy sector remains the absolute outsider in using income-related performance indicators as LTIP with 0%, while 10 of the 11 industry sectors examined showed a range from 14% to 61% when applying such indicators (Reda, 2018, p 41; see Fig. 11).
- In contrast, energy companies and utilities show the highest usage of the TSR as an LTIP pay-for-performance measure (60% of the companies in the energy industry and 63% in the utilities sector) (Reda, 2018, p. 41; see Fig. 11).

In addition, it was shown that almost 60% of the energy industry companies prefer an income-based indicator as a KPI for short-term incentive plans (see Fig. 11 and the discussion in Section 2.3.2.2).

This research did not find a strong model explaining the effect of compensation ratios and/or management activities and efficiency indicators by the preferred STIPs and LTIPs in the energy industry.

The error term of regression models represents factors not included in the data model (see the regression equation in Section 3.5.1). Thus, it was concluded in Section 5.1, that the final TSR growth model that explains 11% of the TSR does not explain 89% of the TSR variance caused by model-exogenous factors. Since the TSR is calculated as the stock price change plus the dividend payout, the stock price changes seem to follow drivers other than those defined in the TSR driver model, as the E&P companies in the sample show substantial average revenue growth rates and a sizeable EBITDA margin:

- The 2018 revenue growth median accounts for 36%, and the mean for 39% (see Table 13), while the 2018 energy sector growth rate of US listed companies is only 17% (CSI Market, 2020a). As, according to the definition, high-growth companies grow by more than 20% per annum (OECD, 2007, p. 61), the sample's companies exceed this measure.
- The same applies to the sample's EBITDA margin mean which is 55% (see Appendix A), while this indicator for the 2018 energy sector is 15% (CSI Market, 2020b).

These findings demonstrate that the sample's companies are—at least compared to other companies in the energy sector—particularly good as far as key parameters such as revenue growth and the EBITDA (as cash-flow proxy) are concerned. Despite this remarkable performance, they show, as already mentioned, a TSR (3 yr.) mean of only 7% and a TSR (3 yr.) median of -5% (see Table 13). For comparison, the BlackRock administered iShares Oil & Gas Exploration & Production UCITS ETF (Acc) tracking of 48 US exploration and production companies shows a negative performance of -41% in the period from 2013 to 2018 (iShares, 2020a).

While the revenue growth, the EBITDA margin, and the ROE belong to the main TSR drivers of tech companies (Milano et al., 2016, pp. 48–49), this is obviously not the case in the E&P industry. As the stock price change is the main factor in the TSR calculation, the question arises—amid the high revenue growth rates and EBITDA margins—which factors other than business performance indicators used in this research affect investor expectations in the E&P business. This is quite interesting, as in cross-industry sample indicators such as revenue growth, income growth, and profitability measures serve as the main TSR predictors (e.g., Trejo-Pech et al., 2015, p. 7; Wolf & Hoffmann, 2017, p. 4).

Besides the fact that the final TSR regression model showed that small but significant exogenous factors represented by the control variables (WTI price growth, US GDP growth) determine firm performance (see Table 19), the behavioral finance theory provides significant evidence for the bounded rationality of investors, so that the general assumption of the TSR driver model that considers the investor as a rational decision-maker driven by fundamental data (business performance data and cash flow data) of the firm must be questioned. Possible explanations from the perspective of macro-economic and behavioral effects are therefore that:

(1) An increasingly important factor that influences the investor appetite towards E&P oil and gas companies is the phenomenon labeled by behavioral finance as a “taste for assets.” As investors prefer ESG-compliant assets, fossil fuel companies become increasingly unattractive.

(2) The second group of possible error term determinants may include the effects of geopolitics and macroeconomics. As can be seen in Appendix E (Table 32) there is a correlation between the oil price growth and GDP growth; the correlation between the oil price growth and the world GDP growth is positive and medium with r = 0.393, whereas the correlation between the oil price growth and the US GDP growth is negative and medium with r = –0.484. This suggests that—during the observation period of this thesis—a high oil price growth went along with a high world GDP growth, whereas it had a dampening effect on the US GDP growth since the US was (and is) largely dependent on crude oil as a source of energy.

While the examination of further possible macroeconomic and geopolitical factors would require a separate study, the ESG issue is indeed an increasingly important topic that the oil industry needs to cope with. As an article asks: "*Are Investors Really leaving Oil and Gas?*" (Clemente, 2019), increasing numbers of big investment funds have left or are considering leaving this business with the climate concern a major challenge going forward and even presenting a risk for survival.

A comparison of the iShares Russell 1000 Growth ETF (IWF; 445 US companies with the strongest revenue and capitalization growth) with the iShares Oil & Gas Exploration & Production ETF (IEO; 48 US E&P companies included in the S&P Commodity Producers Oil & Gas Exploration & Production Index) during January 2014 and September 2020 shows striking performance differences (see Fig. 22). The Russell high-growth companies ETF outperformed the E&P-ETF by a multiplier of 7.86.

Moreover, it is important to consider (iShares, 2020b; iShares, 2020c):

- The price-earnings ratio of the Russell 1000 growth companies' ETF accounts for 37.75, the price-book ratio for 11,
- The price-earnings ratio of the oil and gas E&P companies' ETF is 6.45, the price-book ratio 0.7.

This means that investors are willing to pay almost USD 38 for one dollar in earnings of growth companies but only USD 6.5 for one dollar in earnings of E&P companies and USD 11 for one dollar of the book value of growth companies but only USD 0.7 for one dollar of the book value of E&P companies, which indicates that the market rates the firms' value below their book value.

Figure 22 Russell 1000 Growth Companies to E&P Companies Stock Price Performance Ratio

Source: Author's presentation based on the iShares data from BlackRock

Moreover, the differences in the ESG rating are noteworthy:

- The iShares E&P-ETF shows an MSCI (Morgan Stanley Capital International) quality rating of 4.30 on a 1 to 10 scale,
- the iShares Russell 1000 Growth-ETF shows a rating of 6.8.

All these facts question the reasonability of the TSR as a performance indicator. The findings of this thesis, the cited and discussed literature, and the examination of secondary data suggest that the taste for assets and other factors determine the TSR of E&P companies much more than endogenous firm-related factors such as compensation ratios or management activity and management efficiency ratios. Therefore, it follows that—in contrast to the business performance such as revenue growth—executives can hardly influence the TSR in this context as the exogenous factors mentioned are clearly beyond the executives' control. To repeat, it is clear that factors driven by investor expectations and taste for assets

are of considerable importance, while business performance and the compensation plan design—at least in the form as practiced by the boards of the sample companies—only affect the TSR to a small extent, as the tests including 19 compensation plan efficiency indicators and 6 remuneration policy efficiency indicators have shown.

The results of the t-Test concerning the differences between better and worse performing companies, distinguished by the TSR, definitively show that long-term components of pay must be preferred over short-term elements and that variable pay is superior to cash payments (see Section 4.6).

As discussed in Section 2.3.1, the motivation effects of extrinsic incentives require an evident link between individual performance and, in turn, call for the performance indicators to be within the individual's area of control. Section 2.3.1 concluded that the more independent the performance of an employee from external factors, the higher the variable compensation component should reasonably be because a performance increase of the individual has a direct effect on the performance result and on the amount of the variable remuneration. This must also apply in the opposite case so that it can be asserted that a pay-for-performance compensation design relying on the TSR cannot be viewed as an efficient remuneration policy approach.

In their seminal paper, Bertrand and Mullainathan (2001) demonstrated that compensation governance in the oil industry significantly improves with large shareholders on the board and mitigates the pay-for-luck issue. Davis and Hausman (2018) concluded that good corporate governance reduces pay for luck. It needs to be emphasized that several factors not observed in this thesis due to the research questions and research aims with the focus on business performance, management performance, and compensation plan characteristics—such as ownership structure, CEO/Chairman dual role status, the board size, board independence, the efficacy of the remuneration committee, managerial power, CEO age, CEO turnover, and others—are also typical for industrial companies (Nulla, 2016, pp. 62–69).

The main recommendations by the author of this thesis for E&P company boards and their remuneration committees are to:

- Abandon the use of the absolute TSR as KPI for measuring the performance of executives and reduce the weighting of the relative TSR in the goal-setting.
- Agree with executives on goals that are specific and challenging to keep them engaged and focused; ensure they are committed and buy-in to targets; give them regular candid feedback; give them full support in case of adverse circumstances and help them stay on track.
- Reward executives for good company performance and penalize them in case of poor achievement to avoid asymmetries.
- Strengthen the corporate governance; keep the number of directors in check; whenever possible invite large shareholders to become directors; only select directors with solid experience and expertise; make sure, that the members of the remuneration committee are truly independent with proven skills in compensation matters.
- Emphasize the long-term components of compensation agreements to enforce the focus on strategic issues.
- Ensure a sensible balance between the spending on Capex and the level of debt to mitigate the risk of insolvency.

5.3 Limitations and Research Outlook

This thesis contributes to the issue of pay versus performance for the oil and gas exploration and production industry and also gives answers concerning which management activities have an impact on the performance of companies in this business. For this purpose, descriptive statistics, multiple regression analyses, and t-Testing were performed. The statistical sample consisted of 85 E&P companies listed on the New York and Toronto stock exchanges. A large quantity of financial and operational data was derived from a custom-made Evaluate Energy data base, and a wealth of compensation data from a custom-made Equilar data base.

For the regressions, two accounting-based and one market-based indicator were chosen as dependent variables and a large amount of compensation data and

financial as well as operational data as independent variables. The calculations only indicated small relationships between compensation components and firm performance, which is in accordance with many similar research articles for other industries and for cross-industry analyses. This outcome is quite sobering for the effectiveness of compensation contracts and remuneration policies.

However, as executive compensation is an increasingly important part of corporate governance, retail shareholders, institutional investors, proxy groups, media, and the public expect decisive actions by the boards to pay reasonable compensation and to avoid excesses as they frequently happened in former years. The "say on pay" is an effective instrument to rationalize pay and to allow shareholders to vote on compensation packages. Whilst it is an advisory non-binding vote, companies strive to achieve at least 80% consent to avoid embarrassing discussions. The CEO pay ratio that US companies are required to disclose since 2018 should also produce a moderating effect on CEOs' pay. Shareholders demand transparency and this also increasingly applies to executive compensation. Despite the low cause-effect relationships evidenced in this thesis between firm performance and compensation plans, compensation plan design is an important signal towards shareholders and must be taken seriously. In the oil industry, non-financial measures such as reducing CO_2 and methane emissions, health and safety performance, diversity and minority practices, and measures to protect the environment are also gaining increasing attention. Concerning the other research aspect of this thesis, a strong relationship was found between management activities and firm performance. Thus, while executives can definitively affect firm performance by their deeds, compensation plans can only do so to a limited extent.

In Chapter 1, it was stated that the transfer of performance indicators from a general theory to a specific industry must be questioned because a one-fits-all approach seems to be inappropriate in academic research and in management and governance practice. Therefore, this study is different from many other studies in its multi-dimensional and explorative approach and its focus on one industry, following the findings of Achtenhagen et al. (2010) and Sun et al. (2013) concerning the application of performance indicators in cross-industry samples.

Several limitations follow from this approach. Both the industry-specific perspective and the sampling approach—i.e., including only listed companies with comparable governance and regulatory environments—may limit the transferability of the research results. However, it can be assumed that the general conclusions apply, to a large extent, to stock-listed oil and gas exploration and production companies in other jurisdictions as well. A degree of transferability may also apply to industries with comparably high correlations between profitability and commodity price cycles such as companies in the chemicals, rubber and plastics, mining, steel, gold, and agricultural products industries (Bartram, 2005, pp. 165; 173–175).

Additionally, a certain time selection bias may exist, as the oil price has substantially decreased from September 2014 to 2016—and thereby the revenue and earnings of the whole oil industry—and has only moderately recovered in 2017 and 2018 compared to periods before 2013 (see Fig. 23 in Appendix C). However, the extension of the observation period to the years before 2012 would be problematic because corporate governance regulations and compensation policies have changed considerably (as discussed in Sections 2.2 and 2.3), especially in the wake of the 2008 financial crisis, as Shim and Malik (2019) have shown. This has led to the structuring of the literature review of this research into a pre- and a post-financial crisis period.

Moreover, the data provided by the data service companies showed more missing data before 2013. The quality checks of the regression models show that the panel data approach has not led to a loss of quality of the regression models.

As far as future research on this topic is concerned, it can be assumed that the temporal extension of the data set to years before the observation period of this thesis may not lead to different results concerning the TSR and revenue growth as pay-for-performance indicators; the same applies to the industry-specific economics and the change of investor preferences in the financial markets. Therefore, potential future research in the E&P industry should also consider characteristics such as shareholder power, board independence, remuneration committee quality, Chairman/CEO separation, and factors such as ESG issues as having a possible influence on the remuneration policy and management control. More-

over, it could be explored whether the quantitative research should be supplemented by a qualitative approach in the form of in-depth case studies based on detailed targets such as those described in annual reports or based on special KPIs as prepared by proxy groups and corporate rating agencies to examine and compare factors providing further insights into good and less good company performance.

Appendix A. 2018 Sample Financial Data

Table 30 Sample Companies Sorted by Firm Size (2018; in USD m; n = 85)

Company	Ticker	Revenue	EBITDA	NOPAT	Net Inc.	OCF	FCF
Suncor Energy Inc.	SU	29,691	8,916	3,025	2,537	8,150	4,033
Imperial Oil Ltd.	IMO	25,651	3,648	1,767	1,783	3,021	2,411
Occidental Petroleum Corp.	OXY	17,824	9,507	4,331	4,131	7,669	3,138
EOG Resources	EOG	17,177	7,885	3,584	3,419	7,769	1,899
Husky Energy Inc.	HSE	17,027	3,648	1,246	1,122	3,185	412
Canadian Natural Resources Ltd.	CNQ	16,198	7,525	2,375	1,996	7,797	3,580
Cenovus Energy Inc.	CVE	16,057	975	1,745	2,056	1,659	461
Chesapeake Energy Corp.	CHK	10,265	2,653	410	133	1,730	358
Pioneer Natural Resources Co.	PXD	9,379	3,326	1,052	978	3,242	683
Devon Energy Corp.	DVN	8,439	2,440	3,682	3,064	2,704	375
Apache Corp.	APA	7,348	3,738	664	40	3,777	239
Hess Corp.	HES	6,323	2,502	154	328	1,939	32
Marathon Oil Corp.	MRO	5,902	4,116	1,282	1,096	3,234	587
Ovintiv Inc.	OVV	5,565	2,786	1,329	1,069	2,300	123
Noble Energy	NBL	4,776	2,323	243	66	2,336	976
EQT Corp	EQT	4,736	1,205	1,769	2,245	2,976	97
Continental Resources, Inc.	CLR	4,734	3,449	1,227	988	3,456	416
Antero Resources Corp.	AR	4,133	1,085	181	398	2,082	150
Concho Resources Inc.	CXO	4,118	4,516	2,404	2,286	2,558	168
Southwestern Energy Co.	SWN	3,862	1,214	646	535	1,223	23
Range Resources Corp.	RRC	3,333	936	1,581	1,746	991	24

Company	Ticker	Revenue	EBITDA	NOPAT	Net Inc.	OCF	FCF
Crescent Point Energy Corp	CPG	2,558	1,502	1,903	2,016	1,347	21
Seven Generations Energy Ltd.	VII	2,477	1,266	408	339	1,384	70
Cimarex Energy Co.	XEC	2,339	1,660	829	792	1,551	142
Oasis Petroleum Inc.	OAS	2,322	741	117	35	996	720
WPX Energy, Inc.	WPX	2,229	1,256	341	143	883	445
Diamondback Energy Inc.	FANG	2,176	1,812	1,014	846	1,565	1,483
Cabot Oil & Gas Corp.	COG	2,144	1,184	615	557	1,105	374
MEG Energy Corp.	MEG	2,105	433	74	92	216	335
Whiting Petroleum Corp.	WLL	2,081	1,277	512	342	1,092	132
QEP Resources Inc	QEP	1,988	325	891	1,012	816	377
Parsley Energy Inc.	PE	1,826	1,258	546	369	1,219	742
Murphy Oil Corp.	MUR	1,806	991	556	411	749	1,040
CNX Resources Corp.	CNX	1,761	1,730	1,041	797	886	117
SM Energy Company	SM	1,640	1,458	653	508	721	629
Gulfport Energy Corp.	GPOR	1,479	1,053	542	431	786	81
Denbury Resources Inc.	DNR	1,456	657	352	323	530	113
PDC Energy, Inc.	PDCE	1,390	625	58	2	889	329
Frontera Energy Corp.	FEC	1,320	0	226	259	347	173
Tourmaline Oil Corp.	TOU	1,300	1,090	337	309	978	15
Vermilion Energy Inc.	VET	1,176	798	247	209	629	34
Laredo Petroleum Inc.	LPI	1,106	595	369	325	538	148
ARC Resources Ltd.	ARX	1,075	667	184	165	665	107
Extraction Oil & Gas, Inc.	XOG	1,061	735	219	98	685	504
Enerplus Corp.	ERF	996	629	312	291	569	101
Whitecap Resources Inc.	WCP	969	488	83	50	561	182
Centennial Resource Inc.	CDEV	891	624	234	200	670	579

Company	Ticker	Revenue	EBITDA	NOPAT	Net Inc.	OCF	FCF
Kosmos Energy Ltd.	KOS	887	360	14	94	260	939
Baytex Energy Corp.	BTE	859	182	189	251	374	30
Unit Corp	UNT	843	219	15	45	353	131
Parex Resources Inc.	PXT	833	603	397	403	532	98
Matador Resources Company	MTDR	832	597	357	274	609	1,011
Paramount Resources Ltd.	POU	690	43	267	283	172	258
Gran Tierra Energy Inc.	GTE	613	369	121	103	285	93
Athabasca Oil Corp.	ATH	609	271	402	439	65	211
GeoPark Ltd.	GPRK	600	334	135	72	256	206
Callon Petroleum	CPE	588	490	302	293	468	906
W & T Offshore	WTI	581	427	250	249	322	154
International Petroleum Corp.	IPCO	454	255	104	104	292	154
HighPoint Resources Corp.	HPR	453	400	162	121	231	231
Birchcliff Energy Ltd.	BIR	449	292	97	79	250	26
Penn Virginia Corp.	PVAC	440	376	246	225	272	241
NuVista Energy Ltd.	NVA	416	290	121	105	193	536
Comstock Resources, Inc.	CRK	390	226	86	29	188	123
Bonavista Energy Corp.	BNP	370	223	30	9	224	75
Peyto Explor. & Develop. Corp.	PEY	366	399	129	99	375	183
TORC Oil & Gas Ltd.	TOG	344	198	20	13	227	70
Obsidian Energy Ltd.	OBE	314	8	223	235	76	99
Tamarack Valley Energy Ltd.	TVE	277	189	34	30	182	2
Bonanza Creek Energy Inc.	BCEI	277	213	170	168	117	124
Kelt Exploration Ltd.	KEL	276	137	12	6	144	84
SilverBow Resources, Inc.	SBOW	257	171	96	75	122	131
Cardinal Energy Ltd.	CJ	246	143	54	47	68	9

Company	Ticker	Revenue	EBITDA	NOPAT	Net Inc.	OCF	FCF
Canacol Energy Ltd.	CNE	222	84	19	22	94	6
PrairieSky Royalty Ltd.	PSK	211	187	61	61	181	129
Surge Energy Inc.	SGY	204	34	45	55	94	140
Advantage Oil & Gas Ltd.	AAV	173	113	15	9	115	48
Storm Resources Ltd.	SRX	168	73	33	31	71	12
Earthstone Energy Inc.	ESTE	165	148	98	42	102	103
Ring Energy Inc.	REI	120	52	9	9	70	137
Freehold Royalties Ltd.	FRU	111	96	13	11	103	45
Vaalco Energy Inc.	EGY	105	61	98	98	37	31
Orca Exploration Group Inc.	ORCB	58	42	8	13	29	24
Panhandle Oil & Gas Inc.	PHX	48	22	16	15	27	3
Evolution Petroleum Corp.	EPM	41	22	20	20	21	18
EBITDA Margin (mean) = 55%							

Source: Author's presentation, Data: EVALUATE ENERGY

Appendix B. Variables Set

1) Management Activity Indicators and Management Efficiency Indicators (22 Variables), taken from EVALUATE ENERGY Data Base

1a) Management Efficiency (6 Variables)

Return on Capital Employed (ROCE)

Return on Assets (ROA)

Return on Net Assets (RONA)

Return on Sales (ROS)

Operating Return on Sales (Operating ROS)

Asset Turnover (Revenues / Average Total Assets)

1b) Management Activity: Capital Allocation Ratios & Capital Structure (5 Variables)

CAPEX / Revenue

CAPEX / Depreciation

CAPEX / (Gross) PP&E

CAPEX Growth

Debt-Equity Ratio (Leverage)

1c) Management Activity: E&P Operations Indicators (11 Variables)

Proven Oil & Gas Reserves / Oil & Gas Output (R/P-ratio)

Proven Oil & Gas Reserves Growth

Total Additions less Sales (total additions to proven reserves less sales / oil & gas output)

Oil & Gas Output Growth

Purchase of Petroleum PP&E / Operating Cash Flow

Exploration & Evaluation Expenditure / Operating Cash Flow

Purchase of Non-Petroleum PP&E / Operating Cash Flow

Purchase of Petroleum PP&E / CAPEX

Exploration & Evaluation Expenditure / CAPEX

Purchase of Non-Petroleum PP&E / CAPEX

Total Investing Activities / Operating Cash Flow

2) Executive Compensation Indicators (40 Variables), taken from EQUILAR Data Base

2a) Compensation Components Data (15 Variables), Definitions according to EQUILAR

Realized Pay

Base Salary

Bonus (Discretionary Bonus not planned, based on special performance)

Non-Equity Incentive Plan (NEIP) Payouts (planned Annual Bonus)

Other Compensation (for example value of securities purchased at a discount, company contributions to defined contribution plans, value of life and health insurance)

Value Realized on Exercise (Dollar value equivalent earned on shares acquired upon the exercise of options during the fiscal year)

Value Realized on Vesting (Dollar value equivalent of the number of shares that vest during the fiscal year)

Total Value Realized (Dollar value equivalent earned on shares acquired upon the vesting of stock during the fiscal year)

Realizable Pay

Total Value of Exercisable Options (Total dollar value equivalent of all exercisable options held by the executive as of the fiscal year end)

Total Value of Un-exercisable Options (Total dollar value equivalent of all un-exercisable options by the executive as of the fiscal year end)

Total Value of Unvested Shares (Total dollar value equivalent of the total stock held by an executive that have not yet been vested as of the fiscal year end)

Total Value of Unvested IP Shares (Total dollar value equivalent of the total number of incentive stock held by an executive that have not been vested as of the fiscal year end)

Other Components

Short-Term Incentive Plan (STIP), (Bonus, NEIP)

Long-Term Incentive Plan (LTIP), (Total value realized, Total value exercisable options, Total value un-exercisable options, Total value unvested shares, Total value unvested IP shares)

Total Cash Payments (TCP), (Base Salary, Bonus, NEIP)

Total Executive Costs (TEC)

The **Total Executive Cost (TEC)** is calculated as the sum of fixed pay and variable pay:

Fixed Pay

Base Salary

Variable Pay

Bonus

Non-Equity Incentive Plan (NEIP) Payouts

Other Compensation

Value Realized on Exercise

Value Realized on Vesting

Total Value of Exercisable Options

Total Value of Un-exercisable Options

Total Value of Unvested Shares

Total Value of Unvested IP Shares

2b) Compensation (Structure) Ratios (25 Variables)

Compensation Plan Efficiency Indicators (19 Variables)

Base Salary / TEC

Bonus / TEC

Non-Equity Incentive Plan (NEIP) Payouts / TEC

Other Compensation / TEC

Value Realized on Exercise / TEC

Value Realized on Vesting / TEC

Total Value Realized / TEC

Total Value of Exercisable Options / TEC

Total Value of Un-exercisable Options / TEC

Total Value of Unvested Shares / TEC

Total Value of Unvested IP Shares / TEC

LTIP / STIP

Fixed Pay / STIP

Fixed Pay / LTIP

Fixed Pay / Variable Pay

TCP / TEC

Variable Pay / TEC

STIP / TEC

LTIP / TEC

Remuneration Policy Efficiency Indicators (6 Variables)

TEC / Operating Cash Flow (OCF)

Fixed Pay / OCF

Variable Pay / OCF

STIP / OCF

LTIP / OCF

TCP / OCF

3) Control Variables (5 Variables)

WTI Growth

US GDP Growth

World GDP Growth

Firm Size (Revenue)

CEO tenure (years)

4) Performance Indicators (3 Variables)

Revenue Growth

Net Income Growth

Total Shareholder Return (3 years)

5) Other Descriptive Firm Characteristics Indicators (3 Variables)

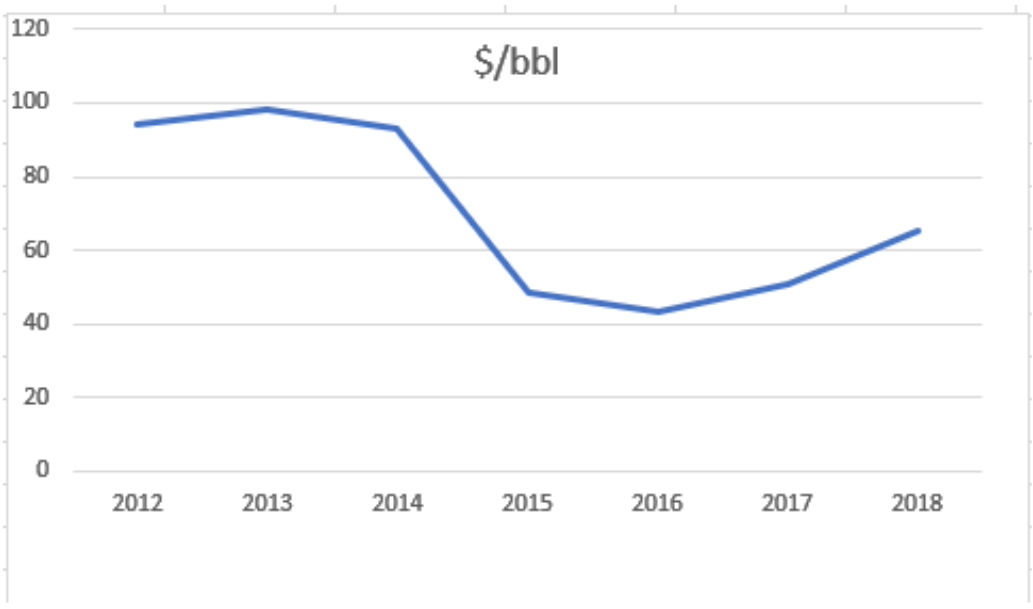
Total Shareholder Return (1 year)

Market Capitalization

Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA)

Appendix C. Oil Price 2012 till 2018

Figure 23 Development of WTI Oil Price



Source: Macrotrends, Crude Oil Prices-Historical Annual Data

Appendix D. Performance Indicators Correlation Matrix

Table 31 Bivariate Correlations among Performance Indicators

		Rev. Growth	TSR (3 Yr) Equilar	Net Inc. Growth
Rev. Growth	Pearson Correlation	1	,175**	0.003
	Sig. (2-tailed)		0.000	0.941
	N	477	477	477
TSR (3 Yr) Equilar	Pearson Correlation	,175**	1	0.013
	Sig. (2-tailed)	0.000		0.771
	N	477	477	477
Net Inc. Growth	Pearson Correlation	0.003	0.013	1
	Sig. (2-tailed)	0.941	0.771	
	N	477	477	477

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's presentation

Appendix E. GDP versus Oil Price

Table 32 Bivariate Correlations GDP Growth / WTI Growth

		World GDP Growth	WTI Growth	US-GDP Growth
World GDP Growth	Pearson Correlation	1	,393**	,173**
	Sig. (2-tailed)		0.000	0.000
	N	477	477	477
WTI Growth	Pearson Correlation	,393**	1	-,484**
	Sig. (2-tailed)	0.000		0.000
	N	477	477	477
US-GDP Growth	Pearson Correlation	,173**	-,484**	1
	Sig. (2-tailed)	0.000	0.000	
	N	477	477	477

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's presentation

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